HANDBOOK
FOR
MENTAL NURSES

SEVENTH EDITION

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HANDBOOK FOR MENTAL NURSES

[*HANDBOOK FOR ATTENDANTS ON THE INSANE*]

SEVENTH EDITION

EIGHTY-FOURTH THOUSAND

Published under the Authority of the Medico-Psychological Association

LONDON
BAILLIÈRE, TINDALL AND COX
HENRIETTA STREET, COVENT GARDEN
1924 (REPRINTED)

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PREFACE TO SEVENTH EDITION

The first edition of this Handbook was published in 1885 by a committee of Scottish members of the Medico-Psychological Association, and consisted of a thin volume of 64 pages. The next edition, "The Handbook for Attendants on the Insane," prepared by a special committee of the Association in 1893, contained 142 pages. In 1908 the Handbook was again revised, and the volume reached 390 pages, and of this last edition over 25,500 copies have been sold. The present volume, under the new title "Handbook for Mental Nurses," contains 585 pages, and is the work of a special committee appointed in 1920

This edition has been entirely rewritten, though much of the material in the last edition has been incorporated. The scope of the book has been enlarged, and follows closely the Syllabus of Training for Mental Nurses laid down by the Association. The authors, however, have not been concerned with the preparation of a textbook merely for examination purposes. They have tried to stimulate interest in the work and to contribute towards the understanding of the problems that arise when dealing with disorders of the mind. With this ideal before them such subjects as the Anatomy and Physiology of the Nervous System and Psychology have been more fully dealt with than heretofore. It is impossible to present these subjects without entering into a considerable amount of scientific detail. Such detail, which is not to be found in any other nursing handbook, is essential for a thorough understanding of the work, and the committee is convinced that it also adds interest to the reader's studies.

The committee is indebted to Dr. E. B. Sherlock for the section on Mental Deficiency; to Professor T. H. Pear for material that has been used in the preparation of the section on the Mind in Health; to Dr. W. D. Wilkins for material used in the section on the Causes of Nervous and Mental Diseases, and for

preparing the diagrams for the section on the Anatomy and Physiology of the Nervous System; to Miss M. Kendall and Miss E. K. Corke for help in revising the text; and to Dr. H. Child, who has made the drawings for Figs. 9, 11, 15, and 58, and compiled the index.

The loss sustained by the Editorial Committee through the untimely death of Dr. James Middlemass was a very real one. His high ideals of life and service are of universal application and permanent value.

Members of the Editorial Committee: Dr. Bedford Pierce (Chairman); Drs. G. W. B. James, T. C. Mackenzie, W. F. Menzies, J. Middlemass, M. J. Nolan, O. P. Napier Pearn, Donald Ross, H. R. C. Rutherford, F. R. P. Taylor, W. Rees Thomas H. Yellowlees, G. W. Smith (Secretary).

February, 1923.

PREFACE TO SIXTH EDITION

ADVANTAGE has been taken of the issue of a Sixth Edition of this Handbook to correct a few inaccuracies pointed out by users of the book. It has not been considered necessary to do more than this, as so short a time has elapsed since the publication of the Fifth Edition.

November, 1911.

PREFACE TO FIFTH EDITION

A NEW edition of this Handbook has been made necessary by the extension of the system of training and examination for the Certificate of Proficiency in Nursing the Insane. It has been found, also, that in certain places the training already given has developed a strong demand for some advanced teaching. The scope of the book has therefore been enlarged considerably, and small print has been used for some of the advanced matter thus included. It must, however, be understood that under no circumstances does the use of large and small print attempt to indicate the limits to which examiners may go in settling the questions for examination. These limits, as heretofore, will be determined by the syllabus issued by the Education Committee of the Association.

The Committee of Revision desire to accord their best thanks to Drs. S. J. Cole, C. H. Fennell, J. Middlemass, D. Orr, E. F. Reeve, H. Roscoe, A. Rotherham, J. P. Sturrock, Tom R. Taylor, for aid rendered to individual members of the Committee in preparing those portions of the work which were allotted to them.

Committee of Revision: H. H. Newington (Chairman), J. Shaw Bolton, Maurice Craig, W. F. Menzies, Bedford Pierce, A. R. Turnbull, A. R. Urquhart, F. R. P. Taylor (Secretary).

November, 1908.

PREFACE TO REVISED EDITION

THE first edition having been exhausted, the Medico-Psychological Association entrusted to a committee of eleven members the task of revising and reissuing the work.

The Committee, taking into account the fact that it is by the authority of the Association republished as the official handbook by which attendants are to be trained, and on which they are to be examined for the certificate of proficiency, has in some respects altered and extended the scope of instruction. This has been proved to be desirable, and, indeed, necessary, by the experience of the capabilities of attendants which has been gained both by teachers and examiners in their carrying out the intentions of the Association in its scheme for training and certification of attendants and nurses.

Questions have been added to the work in order to assist learners in testing their progress towards mastering its contents.

Committee of Revisers: H. H. Newington (Chairman); R. Baker, Fletcher Beach, C. MacIver Campbell, A. Campbell Clark, Conolly Norman, H. Rayner, J. Beveridge Spence, A. R. Turnbull, A. R. Urquhart, E. B. Whitcombe.

1893.

INTRODUCTION TO FIRST EDITION

THIS Handbook has been prepared in the hope of helping attendants on the insane to a due understanding of the work in which they are engaged. It is sought to give them such simple notions of the body and mind in health and disease, such instructions for the management of those maladies with which they are usually brought in contact, and such rules for their guidance in matters of everyday experience, as will enable them to do their work with greater intelligence and watchfulness. It is designed that these instructions should aid attendants to carry out the orders of the physicians; but it is to be distinctly understood that in no case is anything contained in this book to override the special rules of any institution or special orders in regard to any individual case.

Compilers: A. Campbell Clark (Convener); C. MacIver Campbell, A. R. Turnbull, and A. R. Urquhart.

1885.

CONTENTS

SECTION I

GENERAL DUTIES OF NURSES IN A MENTAL HOSPITAL

PAGES

Introduction. General Qualifications of a Nurse : Relation of nurse to patient—Confidential nature of work. *General Duties :* Cleanliness—Order and punctuality—Discipline—Powers of observation—What to report. *Special Duties :* In case of fire—Self-injury—Suicide—Violence—Destructiveness and faulty habits. *Laws and Rules for the Protection of Patients* - - - - - - 1–27

SECTION II

ANATOMY AND PHYSIOLOGY (EXCLUDING THE NERVOUS SYSTEM)

Introduction. Tissues and Systems. Chemical Nature of Body Materials. Skin. Fat. Muscle. Bone and *Cartilage. Skull. Vertebræ. Pelvis. Limbs. Joints* and *Movements. Body Cavities. Surface Anatomy. The Blood. Circulatory System. Lymphatic System. Respiratory System :* Air. *Alimentary System :* Assimilation and digestion—Secretion and excretion. *Urinary System. Reproductive System. Endocrine* or *Ductless Glands* - 28–82

SECTION III

FIRST AID

Methods of Lifting and Carrying the Injured. Removal of Patient's Clothes. Preparation for Reception of Accident Cases. Asepsis and Antisepsis. Bandaging. Bleeding

PAGES

and its Arrest. Emergency Treatment of Wounds. Methods of Artificial Respiration. Some Emergencies: Electric shock—Fainting—Epilepsy—Burns—Bites and stings—Fire — Suffocation — Hanging — Choking — Drowning — Poisoning—Foreign bodies in air passages: eye, ear, nose. *Fractures. Dislocations. Sprains* - - - 83–132

SECTION IV

HYGIENE

General Conditions of Health. Waste and Repair. Day-rooms, Dormitories, Sick-rooms: Ventilation—Lighting—Warming—Cleansing—Insect pests. *Open-air Life. Rest and Exercise. Water Supply. Washing and Bathing. Disposal of Refuse. Clothing. Beds and Bedding. Food Supply. Dietary Requirements* - - - 133–156

SECTION V

PRINCIPLES OF NURSING THE SICK

Requirements and Management of the Sick-room. Open-air Treatment. Reception of New Cases. Sick Diet. Artificial Feeding. Sick-room Cookery: Drinks. *Administration of Medicines:* Hypodermic injections—Ointments. *Beds. Bed Sores. Observation of Cases:* Temperature—Pulse—Respiration—Fæces—Urine—Charts and Records. *Sepsis, Asepsis, Antisepsis:* Antiseptic preparations—Antiseptic principles—General rules for nursing infectious diseases—Dressings and applications. *Enemata. Saline Injections. Suppositories. Catheters. Douches. Inhalations. Special Baths. Splints. Massage—Passive Movements. Operations. Signs of Death:* Care of the dead - - - - - - - 157–223

SECTION VI

BODILY DISEASES AND DISORDERS AND THEIR NURSING REQUIREMENTS

General Symptoms and Signs of Disease: Pain—Headache—Fever—Vomiting—Loss of weight—Anæmia—Inflammation—Fainting—Shock—Collapse—Coma. *Diseases:* Of Skin—Of Muscles and tendons—Of Bones and joints—

PAGES

Of Circulatory system—Of Respiratory system—Of Digestive system—Of Urinary system—Of Reproductive system. *Diabetes. Tumours. Diseases due to Micro-Organisms :* Dysentery — Tuberculosis — Erysipelas. *Diseases of the Thyroid Gland. The Specific Fevers :* Typhoid fever—Scarlet fever — Measles — Small-pox — Diphtheria. *Internal Parasites* - - - 224–281

SECTION VII

ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM

Introduction. Evolution of the Nervous System in Animals. The Neuron : Dendrites—Axon—Myelin sheath—Grey matter—White matter—Neuroglia—Nerve fibres. *Cerebro-spinal System :* Brain—Minute structure of cerebral cortex—Spinal cord—Peripheral nerves. *Involuntary Nervous System :* Autonomic—Sympathetic. *Special Senses :* Smell—Taste—Sight—Hearing—Touch. *How the Nervous System Works :* Reflex action—Physiological levels - - - - - - - 282–329

SECTION VIII

THE MIND IN HEALTH

Psychology : Methods of study—What is the mind ? *Evolution :* Inheritance of ancestral mind. *Brain the Seat of Mind. The Normal Mind. Instincts :* Threefold aspect. *Habits. Behaviour and Conduct. Consciousness. Association of Ideas :* Free—Directed. *Reason. Judgment. The Unconscious Mind :* Repression—Sleep—Dreams. *Psychological Aspect of Mental Symptoms :* Phantasy—Conversion —Projection—Dissociation—Sublimation - - 330–367

SECTION IX

CAUSES OF NERVOUS AND MENTAL DISEASE

Introduction. Heredity : Causes predisposing — Exciting. *Physiogenic :* Age — Sex — Marriage — Injury — Arteriosclerosis—Toxic—Internal secretions. *Psychogenic :* Conflict — Complexes — Repression — Sublimation — Dissociation—Projection—Regression - - - 368–379

SECTION X

SIGNS AND SYMPTOMS OF NERVOUS AND MENTAL DISORDERS

PAGES

Disorders of Sensation: Anæsthesia—Hyperæsthesia—Paræsthesia. *Disorders of Movement:* Ataxia—Paralysis—Tremor—Twitching—Tonic spasm—Clonic spasm—Tics—Convulsions. *Reflexes. Disorders of Nutrition. Interaction of Mind and Body. Postures. Stigmata of Degeneration. Disorders of Mental Functions:* Estimation of mental condition. *Disorders of Perception:* Illusion—Hallucination. *Disorders of Consecutive Thought:* Acceleration — Retardation — Confusion — Disorientation. *Loss of Attention. Disorders of Memory. Delusions:* Systematised—Non-systematised—Fixed—Fleeting. *Disorders of Volition:* Inertia—Stupor—Impulse—Destructiveness—Restlessness—Stereotyped movements—Obsessions. *Disorders of the Emotions:* Affective loss—Morbid anxiety—Depression—Exaltation. *Insane Habits and Propensities. Weak-mindedness and Enfeeblement. Refusal of Food. Insomnia* - - - - 380–425

SECTION XI

SOME NERVOUS AND MENTAL DISORDERS AND THEIR SPECIAL NURSING REQUIREMENTS

Chorea. Epilepsy. The Neuroses: Neurasthenia—Anxiety neurosis. *The Psychoneuroses:* Hysteria—Obsessional neurosis. *States of Depression. States of Excitement and Exaltation. Recurrent States. Alternating States:* Manic-depressive psychosis. *Violence. States of Delirium. States of Confusion. States of Stupor. States of Delusion. States of Mental Enfeeblement. Dementia Præcox. Senile Mental Disorders. Mental Disorders* connected with *Addiction to Alcohol and Drugs. Puerperal Mental Disorders. Encephalitis Lethargica. Meningitis. Apoplexy. Hemiplegia. Organic Dementia. Locomotor Ataxia. General Paralysis of the Insane. Paralysis Agitans. Disseminated Sclerosis. Cerebral Tumours. Mental Disorders* and *Diseases* of the *Endocrine Glands* - - - 426–493

SECTION XII

MENTAL NURSING IN INSTITUTIONS AND PRIVATE HOUSES

PAGES

Reception of New Patients. Bathing. Investigation of the Mental State. Management of the Bodily Health. Management with reference to Mental Condition. Sleep and Insomnia. Removal and Transfer of Patients. Nursing in Private Houses. The Principles of Mental Nursing - - 494–517

SECTION XIII

MENTAL DEFICIENCY

Diagnosis : Earlier Systems of Classification—Physical Peculiarities or Stigmata : Anatomical—Physiological. *Psychological Peculiarities—Clinical Types of Mentally Defective Persons—Grading of Mentally Defective under Mental Deficiency Act—Development of Mind in Childhood—Grading on Basis of Intelligence Tests—Relations of Mental Deficiency to Insanity—Mentally Unbalanced Children. Causation :* Hereditary — Acquired — Doubtful. *Treatment : Management and Training of Mentally Deficient :* Training in the home or ward—In School—In Workshops 518–585

INDEX - - - - - - - 586–615

Note.—References to patients and staff must be taken to apply to both sexes, except in those passages where, as shown by the context, a particular sex is under consideration.

HANDBOOK FOR MENTAL NURSES

SECTION I

GENERAL DUTIES OF NURSES IN A MENTAL HOSPITAL

SPEAKING generally, before we can become proficient in any task which demands skill and training, two conditions must be fulfilled. In the first place, we must find out the object of the task. We must know what qualifications it demands on our part, and the reason for performing it in a particular way. In the second place, we must actually perform it. We must practise the duties it involves repeatedly and carefully until we are efficient. That is how apprentices become skilled craftsmen, medical students qualified practitioners, and probationers trained nurses, not only understanding the duties they have undertaken, but capable of fulfilling them deftly, quickly, and correctly. In other words, they master both the theory and the practice of their craft or profession.

These two conditions of efficiency are found in most walks of life; and they are clearly essential in the occupation with which we are now concerned—namely, that of nursing mental disease. In this section we shall deal mainly with the first condition, or knowledge of the theory, and consider the duties and the principles involved in nursing mental patients, and the qualifications which a trained nurse should possess.

At the outset let us ask: "What is a mental hospital, and why does it exist?" Not long ago this type of institution was known as an asylum, and in many places that is still its name. The word "asylum" means literally a refuge or place of shelter, and it is used in that sense when we speak of an Orphan Asylum or a Blind Asylum. Now, it is well known that in earlier days people

mentally afflicted were treated in a way which would now be considered cruel, or at least callous. It was with a view to safeguarding them against such treatment that asylums were provided, and at the time these were really refuges, or places of shelter. The idea of curing mental disorder, however, was not prominent in the minds of those who established asylums; and it is only of late years that attention has been directed to the actual remedy of such disease, and not merely to the protection of those who suffer from it. That is why the term "mental hospital" is being substituted gradually for the term "asylum." A patient goes to an ordinary hospital or infirmary for the treatment and, if possible, the cure of the malady from which he suffers, and it is most desirable, both for mental patients and for those who nurse them, that the idea of successful or curative treatment should always be kept in the foreground.

This section has been placed at the beginning of the handbook, because some knowledge of the theory and object of nursing is the groundwork of success, and should be acquired as early as possible by probationers. Especially is this the case with regard to the training required for nursing mental patients, which involves daily duties that might appear unnecessary and irksome if the reasons underlying them were not clearly grasped at the outset. Seen in the right light, they will be performed with much greater willingness and thoroughness. Again, though it may be two or three years before the beginner actually becomes an efficient nurse, the general principles of mental nursing are so simple that they may be grasped in a few days, or a few weeks at the outside; while, once understood, they give invaluable guidance for the future. It is hoped, therefore, that this section of the handbook will be carefully read by every probationer, and borne in mind throughout his training.

The original meaning of the word "hospital," which has the same derivation as the words hospice, hotel, and hostel, was a guest-house. Probably the first actual hospital was established in Jerusalem, by the Knights of St. John, for the treatment and care of crusaders who were taken ill in the Holy Land. At one time the name was elastic, and included institutions for the care of persons who had become destitute through infirmity or old age, or for the care of children who had lost their parents, as in the Foundling Hospital in London. Nowadays, the word hospital conveys to most people the idea of an estab-

lishment in which disease is treated, and it is in this sense that we use the term "mental hospital."

There are, of course, marked differences between the mental and the ordinary hospital. In connection with the former, certain legal conditions must be fulfilled, as to the residence of patients, which are needless in the latter. But the fact that such precautions are necessary in cases of mental disease will hardly affect the attitude of the nurse, save in so far as it arouses his sympathy for the patients, and urges him to yet more strenuous efforts on their behalf. He realises that they can do far less to cure themselves than the majority of invalids. Their position is one of more complete dependence, and the nurse must not only perform the duties which would be required in an ordinary hospital, but supply every deficiency on the patient's part which his disease occasions.

In a mental hospital, as a rule, the whole life of the patient must be ordered for him, day and night. Food, occupation, rest, and amusement must be arranged on principles laid down with special reference to the disease from which he suffers and the symptoms he exhibits. Moreover, mental and moral influences must be continually brought to bear upon him, and it is well known that when these are wisely exercised they may go far to effect a cure. On the other hand, when they are used injudiciously and thoughtlessly, the harm done to the patient may be incalculable. Therefore the nurse should strive to develop the mental and moral qualities without which he cannot succeed in his chosen task, whatever he might accomplish in some other sphere.

He need not be discouraged because the ideal before him is a high one—and the higher the better. Every one recognises that the profession of a nurse is very honourable, and that it calls for the exercise of qualities which are universally esteemed, for kindness, patience, tact, unselfishness, and, above all, sympathy. These are required in all forms of nursing, but are especially necessary in dealing with mental cases. It is natural to expect gratitude when one exerts all one's energies for the good of others, and most sick people are quite ready to render this tribute. But mental patients are not always grateful—indeed, they are sometimes the reverse. This is discouraging, and only a high conception of duty and sincere, steadfast goodwill will carry the nurse through.

But more is needed than high ideals and the endeavour to attain them. Without knowledge—good intentions, sympathy, and a keen desire to help the patient may be of little avail. Therefore, by every possible means, the nurse must acquire practical knowledge, and the more he knows, the better he will succeed in realising his ideals. He need not necessarily be clever. The merely clever person, whose knowledge may be wide, but not detailed, is apt to fail when put to the test of practical experience. Study and perseverance will accomplish all that is needed, and will lead to thoroughness and trustworthiness. The probationer who wishes to be a capable nurse must study the textbooks, attend lectures, and gradually become expert in the actual performance of the duties involved. Some of these may be irksome, but the consciousness of a high ideal will lessen difficulties and spur on the learner to surmount them. And here bear in mind that it is not enough to gain the knowledge necessary for obtaining a nursing certificate. An examination is not the only test of efficiency; and it is impossible, even in three years, to learn all that should be learned about nursing. Here, as elsewhere, if one does not go forward, one must go back; for it is wellnigh impossible to stand still. Therefore the nurse should continue to read and study even when the apparent need for doing so has passed away.

The preceding paragraphs may be summed up in the closing words of an eloquent lecture given to nurses by Dr. Mercier, at The Retreat, York:

" These are the ideals towards which we have to strive. The mere acquisition of the necessary knowledge is easy. You will imbibe a knowledge of your duties partly from direct teaching and from your handbook, but mainly you will soak it in from the daily experience of your lives. But over and above knowledge, far beyond it and more important, is character. It is character that counts, not cleverness, not even knowledge; capability and sympathy first and before all; grit and determination; integrity, loyalty, and uprightness; these are treasures that neither moth nor rust doth corrupt, and that thieves cannot break through and steal. We can all acquire capability if we set about to educate ourselves into it; and as to that sympathy, that divine charity, which is so well characterised by St. Paul, we are born with it in various measure, some more, and some

less; but those who have little can cultivate it into much, and those who have much can cultivate it into more. The life's work that you have chosen is arduous and trying beyond the work of most, but it has great compensations. When you watch the subsidence of excitement, the removal of depression, the dispersion of suspicion, the gradual return to sanity; when you open the gates and say farewell, and bid God-speed to a patient whom you have nursed through the valley of the shadow of death and raised out of the deep mire of tribulation; when you send him home clothed and in his right mind, and think of the load of misery you have been instrumental in removing from him and from his family, you taste a joy as refined and as pure as that of the angels of heaven over one sinner that repenteth. Not to every one is it given to govern empires, to explore unknown lands, to discover the secrets of nature, or to enrich nations by some great invention; but we can all do well and truly the work that lies to our hands; we can all contribute to make the lives of those around us happier and better; and we can all live so that, at the inevitable hour when we have to bid an eternal farewell to this earthly scene, many will sorrow for our loss; and we can feel with thankfulness that the world is even a little happier because we have lived—even a little better for our example."

THE NATURE OF MENTAL DISORDER.

A few words are necessary to explain the meaning of mental disorder. It is now generally recognised that the brain is the organ of the mind, and that when a person shows morbid mental symptoms, his brain, or some other important part of his nervous system, is not working in a healthy way. It must be admitted, however, that in many forms of mental disorder it is impossible actually to demonstrate the existence of disease of the nervous system, as one can demonstrate the presence of the majority of physical diseases. But this need not make one doubt the fact of the connection between derangement of the nervous system and mental disorders, a connection which, as time goes on, is being proved in an increasing number of instances. The same stage has been gone through in the case of many physical maladies, which are now satisfactorily explained by recognisable changes in various bodily organs.

The term "mental disorder," therefore, signifies some dis-

turbance of one or more of the ordinary activities which the healthy mind shows in the normal individual. As these activities are exceedingly numerous and intricate, it is not surprising that mental disorders are at least equally complex. The activities of most physical organs, which in health are confined within fairly definite limits, may wander very far away from their regular channels when those organs are diseased. This fact holds good of the brain, and explains in part the great variety in its diseases and symptoms.

In some important respects mental disorder differs from all other disorders. Our sensations, our thoughts, our judgments, and our control over our actions vary with the condition of our mental faculties. When these are impaired, our responsibility for our conduct lessens, and may even disappear altogether. That is the chief reason why separate hospitals exist for the treatment of mental disease, and why it is necessary to deal with it by special legal enactments, which may involve the infringement of the patient's liberty—and liberty is dear, not only to sane, but to insane individuals.

The brain is the most highly developed organ in the body; the most important functions that human beings have to perform depend on its healthy activity, and any disorder which interferes with its efficient working is correspondingly serious. Those who are mentally afflicted merit our keenest sympathy, which will do much to restrain impatience at conduct which would otherwise arouse anger and resentment. The condition of people of unsound mind is usually so helpless that legal protection of a stringent kind is provided to safeguard them against ill-treatment. If a patient is not protected by human sympathy, penal laws exist, and can be enforced.

It may be added that mental disease has special symptoms which ordinary diseases do not present. For example, the tendency to suicide, homicide, or violence, morbid and dangerous bad temper, the refusal of food, and bad habits, are often characteristic of mental cases, and make the nursing of them especially difficult.

GENERAL QUALIFICATIONS OF A NURSE.

The objects of a mental hospital have been summarised thus:

1. To promote recovery, when that is possible.
2. To secure due observation and control of the patients.
3. To encourage suitable occupation and amusement.
4. To insure as much comfort as possible.

Up to a certain point, the structure and design of the buildings will help in the attainment of these objects. Roomy and bright wards, well warmed, well ventilated, and in good order, sufficient food, properly served, and suitable clothing, are all essential, if contentment is to be built upon a firm foundation. Occupation and recreation also do much to help. Yet these things would be of little avail without another element, by far the most important of all. However wisely the authorities plan arrangements, they will fail to achieve their end without the best services of an enthusiastic nursing staff.

The Relation of the Nurse to the Patient, in a mental hospital, is a particularly close one. It is usually prolonged. In an ordinary hospital, the average time spent by the patient is about three weeks; in the mental hospital, it is seldom less than three months, and it may be years. Again, since many patients are incapable of looking after themselves, the nurse must undertake that responsibility with kindness and efficiency. If tactful and sympathetic, moreover, he can do much to promote recovery, and to alleviate the special mental symptoms mentioned above, and the delusions, obsessions, and irritability so common in mental disorder.

But all this will require constant supervision, and the terms existing between the nurse and the patient are of the utmost importance. The faculty of establishing an ideal relationship can hardly be taught in a handbook, but only by practical experience under the guidance of those who have already acquired it. Some indications of its nature, however, may here be given. We can all remember, among our friends, a few who seem to carry with them the sunshine and the healthy breezes. They are sympathetic and yet buoyant, and when they leave us, we feel brighter and happier for having met them. Similarly, in a hospital ward, there are particular nurses whose entrance lightens the gloomiest face, and makes the heaviest heart more

hopeful. The hours pass far more rapidly and pleasantly when such nurses are " on duty."

It is a fact that many sick people recover, less by virtue of a certain course of treatment, than because it is carried out by a doctor or a nurse who possesses this wonderful faculty of getting into touch with the patient, and creating an atmosphere which in itself is healing. Much is said to-day about the influence which one person exerts over another by " suggestion," especially in nervous and mental diseases. Without entering into the whole subject, there is no doubt that in many cases such influence is most helpful. Patients have often declared that they owed their recovery to the sympathetic advice and encouragement received from a particular nurse, and when several patients pay this tribute to the same nurse, it is clear proof that he or she possesses the valuable quality we have tried to describe. If that quality is combined with practical knowledge and efficiency, it will enable the nurse to play a great part in the restoration of mental health

The welfare of a patient depends chiefly on the person in charge of a ward, who is, in turn, dependent on the loyal aid of subordinate officers. All have the most serious duties and responsibilities to discharge, under very difficult conditions. A new-comer, no doubt, may face his duties coolly enough at the outset, but unless he has already, or is prepared to develop, certain necessary moral qualifications, he can never hope to succeed, or even to continue, in the calling he has chosen.

Among these we need not discuss the ordinary morality, decency, sobriety, and honesty which are required of all, especially those who live in close community with other human beings. At present we are concerned with certain points of character, which are looked for, and quickly recognised by, medical officers and head nurses, who have had much experience in judging men and women and testing their fitness or unfitness for this particular task. The presence of these characteristics in the nurse leads to trust and promotion, their absence means failure either to rise in the service or to win the respect and goodwill which most people desire to receive from their superiors or their fellow-workers.

These points of character are so well known that to write of them may seem to be waste of time. Still, the life of a hospital, especially for novices, is full of change, surprise, and sudden

emergencies, which tax the best intentions. It is well for the nurse continually to bear in mind that certain qualities—we might well call them virtues—are quite indispensable, and to resolve that, whatever happens, they shall not suffer eclipse.

Discretion is always a valuable quality in a nurse, but nowhere is it so urgently needed as in the care of mental disease. Here, every word and every action should be guarded. To take some obvious, flagrant examples of indiscretion—for the nurse to tell patients that they are mad, or paupers, or will never get their discharge, or to blame them for conduct which is obviously the result of their disease, is not only unkind, but extremely foolish, since it excites and irritates them.

But there are many other ways in which indiscretion may prove disastrous. To discuss the affairs of other people, especially those connected with the institution, or even one's own affairs, with the patients, is a folly of which, sooner or later, the nurse is almost sure to repent. Patients can seldom keep any information thus gained to themselves. Even if they appear to have recovered, the utmost caution should be observed, since the mental disorder might recur in such a form that they would unwittingly betray any confidence reposed in them. Moreover, a gossip never retains the respect of his patients.

But it is almost as dangerous to gossip outside the hospital. For a medical man to do this is recognised as a breach of professional honour, and here the standard of the nurse should be as high as that of the doctor. This is especially the case where mental disease is concerned, owing to the well-known attitude towards it of the general public. Nursing the mentally ill is a serious and responsible calling, which should be above vulgar garrulity. The nurse must carefully refrain from so much as mentioning the names of patients, whether outside the hospital or before strangers or visitors. As for all thoughtless inquiries from unauthorised persons, they should be referred to the medical officer, who can sift the grounds on which the desire for information is based.

The Confidential Nature of the Work should never be forgotten. When people are mentally unbalanced, they often talk openly of things that they would not dream of divulging when in their right minds. Such outpourings should never be revealed except to a superior officer, to whom they may be of value in dealing with the case. Even repeating some confidence to the patient's

own friends or relatives may do infinite harm, prejudicing them against the patient, or irritating them by the knowledge which outsiders show of their private affairs. Again, if a patient recovers, and has to face a world which is never too sympathetic towards mental sufferers, the situation is greatly aggravated if disclosures made during illness have become public property.

The oath of Hippocrates for medical men runs thus: "Whatever in practice I see or hear, or even outside practice, which is not right should be told abroad, I will be silent, counting as unsaid that was said."

Nurses in mental hospitals might take that pledge with advantage; but it will amount to the same thing if they follow the Golden Rule: "Do to others as you would be done by."

Letters.—Patients differ very widely in the matter of letter-writing. Some scribble all day long, and others never put pen to paper. In most hospitals, however, there are rules as to the number of letters which a patient may send each week, and the nurse must see that these rules are observed, and also exercise a restraining influence over patients who are inclined to tear leaves out of books or magazines for the purpose of letter-writing.

It must be remembered that, as a rule, letters are of a confidential nature. Their contents should not be revealed, nor should they be read, save by those whose duty it is to censor them. They are, however, very important as an indication of a patient's mental state. They frequently reveal what he refuses to say, and much can be gathered from the handwriting. But these points it is for the medical officer to assess, and all letters should be handed on to him promptly and carefully. To do this also saves trouble with the writers, who are usually anxious to know that their letters are really forwarded. If they feel satisfied on this point, they will not try to send them by surreptitious methods, or to give them to visitors to be posted—a proceeding against which the nurse should be on guard.

Visitors.—A word may be added with regard to the treatment of visitors. Many people, on entering a mental hospital, are profoundly surprised to find it a bright and pleasant place. The fact is that the ideas of the general public with regard to such institutions are still based, to a great extent, on ignorance and prejudice. It is important, therefore, that the friends and relatives of patients, and others who come as visitors, should be

so received as to dispel any notion on their part that the atmosphere is one of dreary, hopeless depression. They are so obsessed sometimes by this notion as to be timid and nervous, and everything that courtesy and sympathy can suggest should be done to reassure them, and make them satisfied that each patient receives the utmost care and kindness. Remember, the reputation of the hospital is in the hands of every single nurse. One careless individual, by an action wanting in tact, or offending against the essential spirit of kindliness, may cast a slur on the institution as a whole, and expose all the other members of the staff to unmerited reproach. This fact should always be borne in mind in the reception and treatment of visitors.

Endurance and Cheerfulness.—These are generally found together. They mean that duties are performed throughout with the readiness and zeal which marked the beginning of the work, while troubles and trials are borne serenely and courageously, without losing heart. There is often a sense of weariness, when the charm of novelty has worn off, and a load of dull routine seems to leave no hope of better things. But nurses must remember that others have passed through a similar stage successfully, and have become happy in their work. Cheerfulness on their part lightens both their own burdens and the burdens of those about them, while grumbling nurses, in a mental hospital, menace the general peace. Their discontent not only robs them of any interest and pleasure which hospital life affords, but it infects the patients, and the ward becomes a miserable place and a reproach to those in charge of it. Steady work, and the resolve to do one's best in one's chosen profession, will be found to cure despondency and to teach endurance in a wonderful way.

Firmness.—This is quite essential. A nurse who does not know his own mind is a source of trouble, if not of danger, in a hospital. It is necessary, first, to ascertain just what one's duty is, and then to adhere to it without argument or doubt. When patients, like other folk, understand that in no circumstances whatever will the nurse fail in his duty, they will respect and obey him. But if they see vacillation or indecision, they assuredly begin to take advantage. A considerable proportion of patients are only kept quiet by moral discipline, and if it weakens or is withdrawn disorder naturally follows. Disquiet in any ward which is usually peaceable suggests to the authorities failure on the part of one or more nurses to be sufficiently firm.

There is not the least need, of course, to be harsh or overbearing: such discipline defeats its own end, and patients rebel against it; but in the long run they are generally willing to submit to calm, consistent and just control.

Self-Control.—This is required in two ways. First, control of temper is much needed in the trying circumstances of hospital life. To lose temper with a patient is wrong in principle: it is foolish, and it is disastrous. It is wrong in principle, because the irritating conduct of a patient is a symptom of disease, and one might as well be angry because he has a pain in his head or leg. It is foolish, because the patient may also lose his temper, and wound the nurse with his tongue very effectively. Then there is a deadlock. An appeal to physical force, of course, is out of the question; and the nurse must retire from the wrangle, conscious that a drawn battle really means defeat. Again, it is disastrous, because real authority is materially weakened by each exhibition of temper. A calm demeanour, with the addition of the soft word, checks rudeness and insult, and is the best rebuke to those who can appreciate it; while for those who are quite incapable of understanding, a rough answer has no sting. Again, a reputation for self-control, on the part of the nurse, protects him against the accusations of roughness or harshness which some patients make with facility.

Self-Control in thought and conduct is likewise invaluable. Even when very prompt action is needed, there is always a second for reflection, and he whose thoughts are under control can almost instantaneously decide upon the right thing to do. Novices, at first, may find this difficult, but it will become easier as they gain experience.

Honesty of Purpose.—This means the earnest and sincere endeavour to do one's best at all times. It is true that the lunacy laws, the hospital rules, the instructions (written and verbal) of superiors, and the hints in this book, probably cover among them all the duties for which a nurse can be held accountable. Nevertheless, during the day, there are many chances of helping a patient, by doing little things for the performance of which no one is actually responsible, but which are dictated by absolute honesty of purpose. Again, nurses who are enthusiastic and single-hearted will always do more than the bond requires in their relations to the hospital. They will go out of their way to prevent waste and damage, to aid others in

their work, and to remove causes of friction. Listlessness and lack of interest always make themselves manifest. Sometimes, under a particular officer, things seem to be going wrong for no apparent reason. Yet, under another officer they soon begin to go right. The reason is that the latter is sincerely anxious to do his utmost, and is loyal both to the institution and to his colleagues.

In dealing with many patients, there are temptations to depart from the straightforward methods one adopts towards responsible persons. Sometimes, there is craft, or crookedness, on the patient's part, which invites corresponding behaviour on the part of the nurse. It seems so easy, so natural, and often so profitable, to answer a fool according to his folly ! Again, so much peace can apparently be purchased, for the moment, by making a promise which one has no intention of keeping. It would be wrong, perhaps, to say that in no circumstances whatever should such a promise be made to a patient. It might conceivably be justified in cases of dangerous emergency, involving, perhaps, serious personal injury. But as a general principle, not to be transgressed but for the very gravest reasons, only honest and practicable promises or inducements should be given. Patients may, through mental infirmity, forget the making of a false promise, but they are apt to be very unforgiving if they remember it. But that is the smallest consequence of deception. It reacts on the nurse's own character; and that is its true punishment.

To take another example—a nurse should never, for the sake of peace, agree with the patient's claim that he is all right and has nothing the matter with him. Such acquiescence is sure to make the task of nursing more difficult later on, both for oneself and others. Sometimes silence is the best answer, but if speech is necessary, the nurse must be sincere. Improvement often begins when the patient recognises that he is out of health, and begins to help himself in the work of restoration.

Altruism.—This word simply signifies loving one's neighbour as oneself. What does that mean in a mental hospital ? It means that a nurse should see that his patient not only has all the attention and courtesy to which he is entitled, but something more. It means absolute kindness and forbearance, both in word and deed; inexhaustible patience; the toleration, wherever it is possible, of rudeness, absurdity, and eccentricity; and

sympathy with those inmates who, for one reason or another, are likely to feel their position more keenly than the majority. A nurse can always find out the course dictated by altruism if he says: "Is this what I should like to do, or to see done, for my own father, brother, or sister, or for myself?"

That question, however, may sometimes involve serious difficulties. Suppose, for example, one nurse sees another ill-treating a patient, what is he to do? Tale-bearing is a hateful practice, to be avoided if possible, and yet, he must stop the wrong at once, at all hazards, whether by appeal or by threatening to report the offender, and he must make quite sure that the offence will not recur when his back is turned. To guarantee protection to every inmate is one of the cardinal principles of a mental hospital, to be honoured even at the risk of getting a fellow-worker into trouble.

Where downright cruelty is witnessed, the nurse should report it immediately, if not for the sake of the patient concerned, for his own sake. Should he allow the evil to continue, he also incurs responsibility for it, and may be called to account weeks or months later, as an actual accomplice.

We sincerely hope that nurses who, on entering a mental hospital, are asked to read this handbook, will not put the foregoing remarks on one side as a piece of unnecessary sermonising. The experience of those who have written this book covers scores of years, and has brought them into close contact with thousands of characters, sane and insane. They know how apt nurses are, little by little, to fall away from their ideals, and how difficult it is for them to regain the confidence of their superiors, and the respect of the patients and of their fellow-workers, when these are once lost. The only way to succeed, in the long run, is to have a high standard of duty, and a genuine desire to help and serve other human beings, and to hold these fast day by day, never doing less than one's best. No one, of course, can possess in complete perfection all the moral qualities mentioned above, but everyone should work as if perfection were attainable. It may be added, by way of comfort, that nurses who are true to their ideals will not only reap promotion, but peace of mind, and the honour and goodwill of those about them.

GENERAL DUTIES.

Cleanliness.—As the importance of cleanliness is dealt with at length in the section of this book which concerns hygiene, only a general reference need be made to it here. It is especially necessary in a mental hospital, because many of the patients have habits which take no account of the well-known adage: "Cleanliness is next to godliness." Dust and dirt convey the organisms which are the cause of many diseases, and they also give rise to unpleasant smells, which impair the health, and render those exposed to them more susceptible to illness. Cleanliness not only removes these dangers, but gives the ward a cheerful, bright appearance, which has a most beneficial effect on the patients.

Order and Punctuality.—In any complex organisation, such as an army, a business, or a hospital, the value of orderliness is soon apparent. Even in the common duties of life there are great differences in the way in which various individuals fulfil them. One person is quiet, methodical, busy, but never in a hurry, and his work is done well, with comparative ease. Another is fussy and jerky. He is full of restless activity, and yet, at the end of the day, he has forgotten many duties, and others are performed incompletely. He is a nuisance to others as well as to himself, because he interferes with the tranquil routine of their work.

Nurses should do their utmost, by their general demeanour and conduct, to maintain order in the ward. They should avoid the banging of doors and windows, and loud laughing and talking. In person, they should be neat, and not given to the use of strong scents, heavily scented soaps, or jewellery, and they should not wear heavy shoes, especially when on night duty.

What has been said of order applies in great measure to punctuality. It means expedition, smooth running, and general contentment, while its absence spells delay, irritation, and slipshod work. Each member of the staff should feel that he belongs to a team, and that for its sake he must play the game to the very best of his ability. He must not play for his own hand, or he will endanger the success of the team, and his comrades will very soon regard him with suspicion.

A probationer, new to the work, can hardly be expected to

grasp instantly the relative importance of his various daily duties. Still, he may always be guided by certain principles. He can give careful attention to the details of his work, ascertaining the standard which he should attain, and refusing to be satisfied with anything less. He can be thorough in all he does.

Discipline.—Under this heading is included the observance, both in letter and spirit, of all rules, laws, and directions established to promote the ends for which the mental hospital exists. Discipline must be considered from two standpoints. It concerns, first, the duty of the nurse to the hospital and to his fellow-workers; and, secondly, his duty to the patients, including the discipline which he imposes upon them.

Discipline is imposed on the nurse (*a*) by the Lunacy Laws; (*b*) by the Hospital Rules; (*c*) by the orders, written or verbal, given by superiors, whether general or personal, permanent or temporary; (*d*) by considerations of humanity and right conduct.

(*a*) With regard to the **Lunacy Laws,** few points directly affect nurses, but those which do are of the greatest importance. This subject will be dealt with in the latter part of this section, but here it may be well to point out that, considerably less than a century ago, the mentally afflicted were subject to cruel restraint, coercion, and punishment, and treated with a careless disregard of their common humanity; and, in consequence, very often they became desperate and dangerous. In those days precautions were necessary, the need for which disappeared when the right line of treatment was discovered, and the mentally ill were regarded as patients. This historical fact teaches two useful lessons: A quiet patient may be made violent by bad treatment; and one naturally disposed to violence may become tractable if treated on lines which are both philanthropic and scientific.

(*b*) **Hospital Rules.**—These naturally vary in different places with regard to detail, but in the main they all aim at securing proper care for the patients, combined with the efficient and economical working of a great household. The rules must be faithfully carried out by the nurse, without questioning or argument, since it may be taken for granted that authorities would not trouble to draw up formal rules unless they were compelled to do so by experience.

Some of these rules deal with the application of the lunacy laws within the hospital, and will be mentioned later. Other

rules, though less formal, are of immense importance, notably those enforcing punctuality. When once a nurse has experienced for himself the trouble and annoyance occasioned by the failure of fellow-workers to perform their duties punctually, he should resolve never to be the cause of similar annoyance to others, especially as remissness not only leads to trouble, but may involve serious accidents. The nurse must make himself familiar with all the regulations and arrangements of the hospital, and carry them out in a reliable and conscientious manner. In most institutions he will receive a copy of the rules relating to his work, and these rules he should carefully study and obey.

The instructions for routine work must not be forgotten. These will deal with such matters as the serving of meals, bathing arrangements, the counting of patients, their awakening in the morning, and their supervision when at work or taking exercise. Other routine regulations refer, for example, to the counting of dangerous articles, and special risks, such as that of suicide, which will be discussed later.

(*c*) **Examples of Orders.**—In some wards, by the direction of the medical officer, the patients may enjoy a considerable amount of liberty, and the nurses may supervise them without the aid of locked doors. In other wards greater vigilance is necessary, and the doors must be constantly kept locked to prevent the patients from passing out of direct observation. It is essential that the nurse should never, through negligence, leave open a door which is meant to be locked, or, merely perhaps to save himself some extra work in looking after a troublesome case, lock a door that is meant to be open.

The amount of liberty allowed to each patient is, of course, regulated by the instructions of the doctor. Escapes should be prevented, so far as possible, by watchfulness on the part of the nurses. Certain patients, of course, will need special vigilance, and others, in the restless stage of their disease, often make foolish, aimless efforts to escape. When a nurse takes a number of patients out for work or recreation, he should know exactly how many are with him, and should count them again on his return. It is advisable, also, to look over patients at meal-times or at bed-time, to see if any chairs or beds are vacant that should be occupied.

(*d*) Discipline has a **moral aspect.** With regard to conduct, there are certain things which every right-minded person feels

morally constrained to do or to refrain from doing. No laws can enforce submission to this moral guidance, nor can much be said to indicate the many directions which its compelling but silent influence may take. But no nurse who realises the dignity of his calling, and strives to attain the ideal which has already been outlined, will refuse to respond to this moral call, or deny its reality. The more ungrudgingly it is obeyed, the less need will there be to call attention to the penalties which breaches of discipline entail.

With regard to the discipline which they impose on patients, nurses should always remember that example is better than precept. They should themselves be models of neatness, punctuality, and orderly conduct, and should treat both the patients and their fellow-workers with sympathy and courtesy.

Few persons can exercise control over others, especially over the weak, without occasionally being tempted to abuse their authority, and the nurse who is coarse in fibre, and lacking in sensitive feeling, is very apt to tyrannise. All nurses should bear in mind that the power entrusted to them over their unfortunate fellow-creatures should be wielded justly and considerately, never for the purpose of retaliation, and never to gratify a vainglorious desire to lord it over others, but always with a single eye to the welfare of the patients. Since they know that the latter are not really responsible for their actions, they should not resent rude language, or rough conduct, but meet it with kindly forbearance, firmness, and self-control. They must never, on any account, resort to punishment. Abnormal conduct should be reported to the doctor, who will adopt the proper medical means of checking it. Such a check will be far more effective than summary treatment by a nurse, just as society is far better governed when magistrates deal with offenders than when every man takes the law into his own hands. Nurses should try to win the confidence of patients by sympathy and consideration. They should show no favouritism; neither should they hold themselves aloof, or be content with mere supervision. Rather, they should join heartily in the occupations and amusements of those under their care, working both with and for them. Much may be done by personal influence, and a patient is often docile and quiet with one nurse, who guides him in the right way, when another finds him intractable.

When it is necessary to refuse the request of a patient, or to

enforce control over him, nurses should refer to the rules as their reason for so doing, rather than flaunt their own authority. This arouses far less irritation in patients. Above all things, it should be remembered that "a soft answer turneth away wrath." No maxim is of more value in dealing with mental disorder or will save a nurse more trouble in the end. Again, tact is continually needed—the knack of knowing just what to do or say, which cannot be taught on paper, but which can be acquired by the nurse who forgets himself in his patient.

Observation.—The nurse should continually cultivate his powers of observation. This is important in dealing with all persons who are ill, or liable to illness, but it is especially needful in the case of mental patients, who are frequently unable to understand or to explain their condition. Doctors cannot succeed unless they develop the faculty of observation, and nurses, who see their patients much more continuously, will find it invaluable in their work. It not only increases their usefulness, but adds interest to their duties, and enables them to render most useful help to their superior officers.

What to Report.—To know the relative importance of various symptoms observed in patients requires time and experience, but some guiding principles may be laid down. Speaking generally, there are two classes of symptoms which should be reported. The first are sudden changes in any patient's state or appearance. Many changes are quite obvious, and would naturally be considered worthy of report. They usually indicate corresponding changes in the disease, physical or mental, from which the patient is suffering, or they may be produced by the outbreak of an entirely new disease. In either case, they are significant, as the treatment may have to be changed, and the sooner that is done the better for the patient. But there are other symptoms, almost equally important, which are far more likely to escape being reported. The beginning and the progress of many diseases are very insidious, and cannot be detected by a casual glance. To discover them, the faculty of observation above referred to must be called into play. From time to time, the nurse should compare the present condition of a patient with his previous condition, and any alteration should be noted. Changes in emotional tendencies, in habits, in appetite, in weight, in speech, and in other characteristics, must be diligently looked for, and duly reported when found.

Symptoms of the second class are related to the ordinary daily functions of the bodily organs. These are dealt with in detail in the section on Sick Nursing, and need only be mentioned here. Among them are all details connected with the taking and digestion of food. The quantity of food consumed, the way in which it is chewed and swallowed, the comfort or discomfort of a person after a meal, and the presence of any unusual symptom—such as pain, sickness, or flatulence—should all be noted. Another especially important function is the regular movement of the bowels. There are variations in this respect, even among healthy people, but, speaking generally, it should occur about once a day, and if it fails to do so, constipation is present. This causes many troubles, especially among mental patients, and those who have a tendency towards it should be the subject of particular attention.

Similarly important is the regular emptying of the bladder. Derangement of this function is much less common than constipation, but its consequences are far more serious, since, if the bladder is not emptied for twenty-four hours, the patient's life is jeopardised. Sometimes derangement takes the form of too frequent emptying of the bladder, and this, though not so urgent, is of importance, just as is diarrhœa in connection with the digestive system.

Symptoms may also be present which indicate other bodily maladies. The complexion may alter, indicating derangement of the circulation, from heart disease, or disorder of the liver or some other organ. Breathlessness on exertion, or any difficulty in breathing, unsteadiness in walking, the weakness of the muscles on one side of the body, any kind of pain, unnatural swellings, difficulty in swallowing, eruptions on the skin, shiverings, depression—in short, anything unusual should be noted and reported. Any kind of accident, violence, bodily illness, threatening language (suicidal or homicidal), unusual mental symptoms, or attempts to escape, should of course be reported immediately. But nothing should be looked upon as too trivial to notice in dealing with mental cases, and the nurse should keep accurate notes in order to be able to state all the facts to the doctor. The matter of sleep is so important that later on it is dealt with in detail, and is only referred to here as calling for particular attention.

SPECIAL DUTIES.

It is impossible to enumerate all the special duties of a nurse. They must be learned gradually, as training progresses and experience is gained. But with some of them the nurse should become acquainted at the very outset of his career.

Fire.—For instance, he must find out exactly what to do should a fire occur. In every mental hospital there are rules for dealing with this emergency, and the staff are instructed in the use of the fire appliances which are provided. These instructions are most important, and every effort should be made to become so familiar with them as to carry them out calmly, and almost automatically, at a time when excitement would prove fatal. The first few moments after the fire alarm is given may be wasted in panic, or spent in promptly extinguishing the fire or removing the patients to a place of safety. With regard to this emergency, every institution has its own rules, which should be implicitly obeyed; but there are certain general precautions which should always be taken.

1. Fires not in regular use must not be lighted unless specially sanctioned.

2. The grate should never be filled too full.

3. All ordinary fires should be put out in rooms which are not actually in use.

4. Ashes from the grates should be taken outside at once, and not put in the ward store or scullery. The majority of the fires in hospitals result from the neglect of this simple precaution.

5. Any material which burns readily, such as floor polish, or floor-cloths saturated with turpentine, should never be thrown on a fire or into a bucket containing ashes.

6. Safety matches alone should be used, and patients should not be left in possession of matches.

7. Lighted coals should never be carried from one grate to another.

8. In most institutions guards are placed in front of the fires, and these should not be removed while the fires are burning.

9. Waste paper and other rubbish must not be allowed to accumulate in ward cupboards.

If these rules are observed, a fire will very seldom occur.

Self-injury or Suicide.—Another special duty is to prevent patients from injuring themselves or committing suicide. When

that tendency is suspected, the doctor usually gives instructions for the patient to be kept under the direct and constant supervision of a nurse. Such instructions should be carried out with the utmost faithfulness. There must be no negligence, no allowing the patient to wander away from the room. When he passes from the charge of one nurse to that of another, there should be no interval. The first nurse should not relinquish his duties till the second has definitely taken them over, and in some instances the second signs his name to show that he has assumed responsibility.

So much ability and shrewdness are displayed by suicidal patients in the endeavour to accomplish their purpose that the only safe rule may be expressed as follows: "*Never on any account, even for one second, permit a patient of suicidal tendencies to eave your sight, no matter upon what excuse or however plausibly his desire for privacy may be urged, until those under whose authority you are acting withdraw the orders issued with regard to such a patient.*"

Suicidal patients should also be systematically searched at prescribed periods during the day; and at night care should be taken that nothing is concealed about their rooms, beds, or persons which might be used as an instrument of self-destruction.

Much ingenuity is often exhibited by patients in the construction of dangerous weapons from all kinds of out-of-the-way articles, such as broken stay-busks, pieces of old iron, nails, slate, glass, etc. Stockings, neckties, boot-laces, tapes, garters, apron-strings, strips of calico and dress material, braces, bandages, blind-cord, roller towels, have all been used, often with fatal effect, by patients who manifest this distressing symptom of mental disease. The possibility of suicide by the improper use of matches should not be overlooked.

It is not enough to keep articles which might be converted into dangerous weapons out of the way of those under suspicion. Nothing is easier than for a cunning suicidal patient to obtain from another patient who has no such tendencies some apparently harmless plaything, which may thus become a source of grave peril. Knives, scissors, razors, and all sharp instruments should be kept under lock and key and counted daily, while broken glass or crockery should be immediately removed from the reach of patients.

The cause of any smell of fire or gas, or any offensive or unusual

odour, should be ascertained at once, or, if that is impossible, the nuisance should be reported without delay to a superior officer.

All doors, windows, shutters, fireguards, etc., should be inspected closely and constantly, and any defect, however trifling, reported.

Medicines should never be entrusted to the care of patients, but kept under lock and key. They should not be kept in the same cupboard as disinfectants, which are often of a corrosive and poisonous nature. The instructions on the label should be carefully read before a dose of medicine is administered.

Patients should not be allowed to enter nurses' rooms, where forbidden articles may be acquired. Keys should never be left in the lock or lying about, and the loss of one should be reported immediately. That the risk of scalding or drowning may be avoided, the attendant must retain the bathroom key in his own possession. Cold water should always be turned on first, the waste tap should remain open when the bath is not in use, and the patient should never be left in the room while there is any water in the bath.

When it is necessary to search a patient, it should be done thoroughly, but in such a manner as to avoid irritating him. Rubbish, food, and anything which might prove dangerous should be taken away; but sometimes patients treasure harmless possessions of little value, of which it would be positively cruel to deprive them.

Violence.—There are several rules as to what is to be done if a patient becomes violent. If possible, a struggle should always be avoided. When it is necessary to use force, the nurse should not attempt to deal with the patient single-handed, unless there is no help for it. It is far better to summon assistance. If the patient sees several nurses together, he will often submit quietly; while, if he continues to struggle, he can be mastered with comparative ease, and the chance of his receiving injury is much lessened. Only inexperienced nurses pride themselves on managing a troublesome patient single-handed. Personal struggles are often dangerous to both parties, and they tend to create bad feeling. Sometimes a patient, though quarrelsome and irritable, can be safely left alone, and then it is better for the nurse to leave him than to risk a struggle. His condition, however, should be promptly reported. In this connection we may note that it is likewise a foolish mistake to try to lift heavy patients

without help. Nurses sometimes attempt too much in this way, and bruises, if not worse things, are needlessly caused thereby.

Speaking generally, whenever physical force or strength is necessary, the services of two or more are better than the services of one. Force can be applied at more points, and over a greater area, with the result that the force applied at any one point is considerably less. There are certain points to which force should never be applied, the ribs being a specially important example, The knees should not be placed on any part of the patient's body, nor should his wrists be twisted. It is important to remove the patient's shoes as soon as possible. Nurses should always report the occurrence of a struggle at once, so that any injury may be discovered and treated without delay. As a rule, force should not be used unless a patient is actually dangerous, and even then it should not be continued longer than is absolutely necessary.

Pokers, fire-shovels, towel-rollers, brooms, mops, etc., may prove awkward articles in the hands of a violent person, and for this and other reasons should be kept in a locked cupboard when not in use.

Destructiveness and Faulty Habits.—Patients often exhibit destructiveness or other mischievous habits. These should be repressed as far as possible, and good habits should be encouraged in their place. Slovenliness in dress, and disorderliness in eating, should be checked. Sometimes, however, patients, while refusing all food offered to them, will consume anything they can pick up unobserved, and advantage may be taken of that peculiarity to persuade them to eat. They should be prevented, however. from eating leaves, cloth, and other improper things, which may injure them seriously. Some patients swallow ravenously, stealing food from the plates of others, and cramming it into their mouths at the risk of choking. This propensity should be guarded against. Dressing fantastically, in obedience to a delusion, should not be permitted.

When dirty habits are due to the mental condition, not to bodily paralysis, much may be done to cure them by careful training in regular and correct ways. Bad sexual practices, unfortunately, are common among the mentally ill, and must be guarded against, and prevented as far as possible. The detection of any such habit should be reported, and when the patient himself is desirous of checking it, he should be encouraged by wise advice, and by help in finding suitable occupation and amusement.

LAWS AND RULES FOR THE PROTECTION OF PATIENTS.

Reference has already been made to the existence of laws, rules, and orders, for the protection of patients who are deprived of their personal liberty and detained in a hospital. Many of them are unable to protect themselves, and may even need protection from themselves, and there is always the possibility that those in authority over them may be unjust or injudicious. The law of the land, therefore, inflicts definite penalties on those who abuse their position and neglect or ill-treat the patients under their charge, or allow them to escape. The sections of the Acts in **England** relating to these misdemeanours are:

Lunacy Act, 1890, Section 322.—"If any manager, officer, nurse, attendant, servant, or other person employed in an institution for lunatics, or any person having charge of a lunatic, whether by reason of any contract or of any tie of relationship, or marriage, or otherwise, ill-treats or wilfully neglects a patient, he shall be guilty of a misdemeanour, and, on conviction on indictment, shall be liable to fine or imprisonment at the discretion of the court, or be liable on summary conviction for every offence to a penalty not exceeding twenty pounds nor less than two pounds."

Section 323.—"If any manager, officer, or servant of an institution for lunatics, wilfully permits, or assists, or connives at the escape or attempted escape of a patient, or secretes a patient, he shall for every offence be liable to a penalty not exceeding twenty pounds nor less than two pounds."

Section 324.—"If any manager, officer, nurse, attendant, or other person employed in any institution for lunatics (including an asylum for criminal lunatics), or workhouse, or any person having the care or charge of any single patient, or any attendant of any single patient, carnally knows or attempts to have carnal knowledge of any female under care or treatment as a lunatic in the institution, or workhouse, or as a single patient, he shall be guilty of a misdemeanour, and, on conviction on indictment, shall be liable to be imprisoned with or without hard labour for any term not exceeding two years; and no consent or alleged consent of such female thereto shall be any defence to an indictment or prosecution for such offence."

In **Scotland,** offences are punished under 20 and 21 Vict., cap. 71, sect. 99: "If any superintendent, inspector, officer, or servant, or other person, employed in any public, private, or district asylum or house, or otherwise having the care of any person detained as a lunatic patient . . . shall wilfully maltreat, abuse, or neglect any person so detained to the injury of such person, such superintendent, inspector, officer, or servant, or other person, shall be guilty of an offence, and for every such offence be liable in a penalty not exceeding one hundred pounds, or to be imprisoned for any period not exceeding six months."

It is against the law, and punishable by the law, for anyone without proper authority to "mechanically restrain" a patient. Such restraint has been defined thus (in England): "It shall be and include all instruments and appliances whereby the movements of the body or of any of the limbs of a patient are restrained or impeded."

There is a rule against the improper use of seclusion, a breach of which is a most serious matter. Seclusion has been defined (in England) as the enforced isolation of a patient by day, between the hours of 7 a.m. and 7 p.m., by the closing, by any means whatever, of the door of the room in which he is.

Restraint and seclusion are not illegal if ordered by the responsible medical officer. They are illegal if practised by a nurse without this authority.

Intoxicating liquors and drugs must only be given under medical order. The hypodermic injection of morphine, cocaine, or other drugs, without specific medical instructions, is not only highly dangerous, but is illegal.

To those who have not had considerable experience in dealing with the mentally afflicted, some of the warnings and suggestions contained in this section may appear fanciful and unnecessary. But the majority of them are based upon incidents which have actually occurred, while they are all the result of long and intimate acquaintance with the peculiarities of mental patients.

While it is very important that due attention should be paid to the rules laid down for the discipline of the establishment and the guidance of nurses, it is impossible to formulate a code of regulations that will cover every conceivable emergency; and much must be left to the common sense and judgment of those directly concerned with the patients. A good nurse has some

knowledge of the laws of health; he has attained self-control; he knows his own mind, and possesses those moral qualifications which are summed up in character; he takes a personal interest in those under his charge, and constantly endeavours to promote their recovery and well-being by every means in his power. He encourages them by his example, and controls their wayward tendencies by firmness, gentleness, and patience. He never forgets that the burden of the most hopelessly demented may be lightened by his treatment, while the prospect of restoring health to others spurs him on to fresh exertions, and success in the accomplishment of his task rewards him for all his labours.

SECTION II

ANATOMY AND PHYSIOLOGY (EXCLUDING THE NERVOUS SYSTEM).

ANATOMY means the study of the structure or composition of the body, and physiology means the study of the functions or vital uses of the different parts of the body.

The human body resembles a highly complicated machine. Like a machine, it consumes fuel, stores up energy, and produces movement, but it is much more than a mere machine: it is endowed with life, and attends entirely to its own needs. It prepares its own fuel and the materials necessary for its own repair; it stokes itself, and repairs and replaces its various parts as they wear out; it is capable of sensation and of thought and of independent action, and can transport itself from place to place; lastly, it is capable of growth and of reproduction.

From another point of view, it may be likened to a large, well-equipped institution, with different departments specially adapted for carrying out all its requirements. It possesses stores and kitchens for the accumulation, preparation, and distribution of food and fuel. It ventilates itself by a special mechanism for the supply of pure air and the removal of impure air. It has a heat-regulating system, drainage systems for the removal of waste and useless materials, and a wonderfully organised department at the head of affairs to direct everything. One of the ways in which it differs from an institution devised and built by human hands, is that its food and fuel are distributed, and its waste materials are removed, by means of a sort of water-carrier system which circulates ceaselessly throughout all parts of the body. This process is carried out by means of a force-pump (the heart) and a system of elastic tubes (the blood-vessels and lymphatic vessels), and the fluid passing along these, on the one hand, collects pure air, food, and fuel, and distributes these wherever required, and, on the other hand, gathers up the products of combustion and other waste products of body

activity and discharges these by various methods. The body differs still more from an institution in that both the whole and the several parts possess the power of movement.

The body is, however, much more complicated than the most elaborate machine or the largest institution; and, further, it differs entirely from these in the fact that every single element of which it is composed is individually alive. Imagine an institution in which every single brick or stone, and every piece of metal, wood, or textile material, is alive—an institution, moreover, which is able to execute its own repairs, and even to replace some of its units when they are worn out.

Cells.—All living tissues, whether animal or vegetable, are built up of cells; the larger and more highly developed the organism, the greater the number and variety of cells. Each

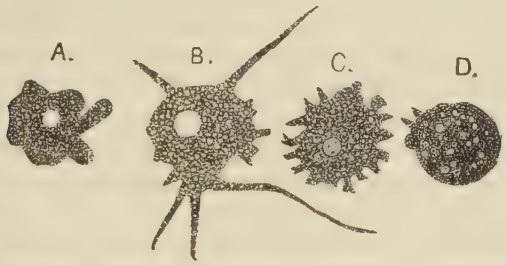


FIG. 1.—AMŒBA: SUCCESSIVE CHANGES IN SHAPE DURING MOVEMENT. (Stewart's "Physiology.")

cell consists of a minute mass of living material called "protoplasm," enclosed within a fine envelope or cell wall. These cells vary greatly in size and structure. In animal tissues they are far too minute to be seen by the naked human eye, and can only be distinguished and examined under a powerful microscope. Some idea of their minuteness and delicacy may be formed when one is told that under the microscope they are found to vary from $\frac{1}{300}$th to about $\frac{1}{4000}$th inch in diameter.

The smallest and simplest known creatures in the animal kingdom consist of one single cell, which carries out all the essential functions of life. The simplest of all is the "amœba," which is found in mud and slime and stagnant water. It absorbs its minute particles of food by spreading round them and so engulfing them; it gets rid of its waste matter by an equally simple process. It moves about by pushing forward a portion

of itself and drawing the rest after; it has no sex, but reproduces itself by splitting into two equal parts, which quickly grow to the original size and so produce two amœbæ. Within the soft, jelly-like protoplasm is found a small portion called the nucleus, which is denser than the rest, and exercises a controlling influence over the activities of the cell. Any portion of the cell cut off from the nucleus rapidly degenerates and dies.

When the cell divides itself in the process of reproduction, the nucleus first divides into two parts, one going to each side of the cell, which then splits into two cells with a nucleus in each.

A slightly more advanced form of animal life is found where several cells are united together and begin to be differentiated, some cells developing special characteristics and taking on special functions: some being set apart to feel, some to absorb food, others to excrete waste products, and so on.

The higher we go up the scale of animal life, the more complicated do these differentiations become. The human body, like all other forms of animal life, is built up of countless millions of such tiny units or cells, each specially developed for the particular function of the part to which it belongs. These cells have been compared to the individuals in a community, each having its own duty to perform in the general work By special adaptations and combinations of the various kinds of cells the body is built up into tissues and organs. As the different tissues vary much in appearance, texture, and consistence, so do the individual cells in these tissues vary in shape and structure.

Some of the tissues and organs are bulky, and familiar in appearance to everybody, such as the skin, fat, muscle, or flesh, bone, and the larger organs, such as the heart and the liver These human tissues may be seen and carefully studied at post-mortem examinations, and they are in the main very like the skin, flesh, bone, and organs of the larger animals, which may be seen any day in a butcher's shop.

An " organ " is a special part of the body, which performs a special work. For example, the stomach is one of the organs of digestion, the eye is the organ of sight, the tongue is an organ of speech. The special work which an organ has to perform is called its " function," and it may have one or more functions.

The tissues are grouped and built up to form different important systems. These are:

The **Skeleton,** built up of bones, cartilage (gristle), and liga-

ments. It forms the supporting framework of the body, and is jointed to allow movements to take place.

The **Muscles** or flesh which produce the movements of the limbs and body.

The **Skin** which forms an outer protective covering for the whole body.

The **Fat** which underlies the skin and also surrounds, pads, and protects the more delicate deeper organs.

The **Alimentary System,** consisting of the organs whereby food is taken in and digested for the maintenance of the body.

The **Respiratory System,** consisting of the lungs and air-passages whereby we breathe.

The **Circulatory System,** consisting of the heart, bloodvessels, and lymphatic vessels, whereby the blood is carried to and from all parts of the body.

The **Excretory System,** which collects and removes waste products from the body.

The **Reproductive System,** consisting of the generative organs.

The **Nervous System,** consisting of the brain, nerves, and special sense organs, which controls the functional activities of the body and also enables us to feel and think and direct our actions.

The human body thus requires to be studied like a machine, from two points of view—how it is constructed and how it works. In other words, it is necessary to consider first its **Anatomy** or structure, and, secondly, its **Physiology,** or the functions and uses of its several parts.

Chemical Nature of the Body Materials.—Everything in this wide world, whether animal, vegetable, or mineral, living or inanimate, solid, fluid, or gaseous, has been proved to consist of " elements," existing alone or in a great variety of combinations. The branch of science which deals with the study of the composition of matter is called chemistry. By its means it has been found there are a certain number of substances in nature which cannot be split up into anything else. These are called " elements," and all other substances consist of two or more, or even many, " elements," existing in combination, and are distinguished by being called " compounds." It must be understood that a chemical compound is not a mere " mixture," but a very definite union of the elements of which it is formed. To give a few simple examples: oxygen and hydrogen are elements, water is a compound consisting of these two combined; iron

is an element, rust is a compound of iron and oxygen; common salt is a compound of the elements of sodium and chlorine; and so on in multitudinous variety and complexity.

Organic materials—that is, living tissues or their products—whether vegetable or animal, and no matter how complicated the combinations, can all be resolved eventually into elements. There are a number of such elements concerned in the composition of the human body. The most important are **carbon, hydrogen, oxygen,** and **nitrogen.** These do not exist alone in the body, but combine in varying proportions with a number of other elements, such as **calcium** (lime), **sulphur, phosphorus, iron, sodium, potassium,** etc., to form a very large number of compounds; and thus there is constantly going on in all parts of the body a remarkable display of chemical activity with a corresponding production of heat and energy. Living cell-substance, commonly called **protoplasm,** when analysed (a process which necessarily kills it), is found to consist of very complex chemical bodies called **proteins,** which can be split up into carbon, hydrogen, oxygen, nitrogen, and sulphur.

SKIN AND ITS FUNCTIONS.

The skin is the outer covering of the body. It consists of two main parts or layers: (1) An outer layer of scarfskin, called the **cuticle,** or **epidermis;** and (2) a deeper layer called the true skin, the **cutis vera,** or **dermis.**

The **epidermis** is composed of several layers of cells. Being on the surface it is subjected to a good deal of wear and tear, and as the surface cells get rubbed off they are replaced by others from the deeper true skin. When we wash our hands, we are not only removing dirt, we are also scrubbing away the superficial cells of the epidermis. It is this which peels off in flakes and scales after scarlet fever and certain other diseases. When a blister forms, the fluid it contains lies between the epidermis and the true skin, or dermis, which consists of layers of skin cells and fibrous tissue.

The **dermis,** though thicker than the epidermis, is of a finer texture, and contains: (1) slender thin-walled blood-vessels called the **capillaries;** (2) **nerve filaments,** with special sensitive nerve endings by means of which we feel; (3) **hair follicles,** or tubes in which the hairs are embedded; each

hair ends in a fine bulbous root through which it receives its nourishment from the capillaries; (4) **sweat glands,** tiny tubes which lie in the true skin, but open out through the surface of the epidermis and pour out minute drops of sweat; (5) **sebaceous glands,** which produce small quantities of a fatty or oily substance, which helps to soften the outer cuticle and keep it from becoming too dry. It also lubricates the hairs and gives them their natural glossiness.

The following are the functions of the skin: (1) It is the outer covering, and acts as a protection and support to the deeper structures. (2) By means of the special nerve endings, it communicates external sensation, or touch. (3) It helps to regulate the temperature of the body. This is done by its capillaries, which carry blood to the surface, where it gets cooled, and by the outpouring of sweat from the sweat glands. According to the state of dilatation or contraction of the blood vessels, more or less blood is carried near the surface and consequently more or less heat is given off from it by radiation. When the body becomes too hot, as in cases of fever, the skin vessels dilate and the skin becomes flushed; when it becomes heated by exertion, sweat is poured out, and as this evaporates it cools the surface. By this means the temperature of the healthy body is kept constant. In the average individual it is about 98·4° F., and this is spoken of as the normal temperature. (4) The skin drains off waste matter by the sweat glands, and its importance as a drainage channel cannot be too much emphasised. The sweat which these glands excrete from the blood is a watery fluid which contains some waste matter in every drop. (5) The skin has a slight power of absorption, especially of oily and greasy substances. This is why medicated ointments and oily liniments are rubbed into it.

The **nails** of the fingers and toes are modifications of the outer skin layer. They are composed of hardened and horny epidermic cells.

FAT AND ITS FUNCTIONS.

Lying immediately below the skin is a fatty or adipose coat. It is composed of masses of tiny oil droplets, in cells lying in a fibrous meshwork which unites the skin to the deeper tissues. The functions of fat are: (1) By its softness and elasticity it serves as a cushion to pad and protect the underlying

structures. (2) It helps in the regulation of the body temperature by protecting against cold (Arctic animals have enormous layers of fat upon them—*e.g.*, the blubber of the whale). (3) It acts as a storehouse for the accumulation of a reserve of fuel and nourishment (a very special instance is seen in the camel's hump). (4) Incidentally, by filling up hollows and giving roundness to the outlines, it adds grace and softness to the contours of the body.

Fat is found in many deeper parts of the body cavities, padding and protecting some of the important organs. It varies in amount in different individuals, and is never wholly absent except after prolonged periods of fasting or of wasting disease.

MUSCLE AND ITS FUNCTIONS.

Muscle is the material which forms the flesh or lean meat. If we were to strip off the skin and subcutaneous fat we should lay bare the flesh and find that it consists of a number of distinct

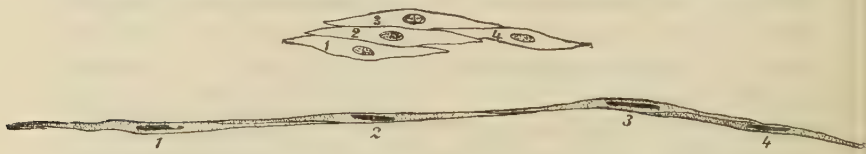


FIG. 2.—MUSCLE FIBRES: THE UPPER GROUP CONTRACTED.

and separate muscles. Each muscle is enclosed in a sheath of thin fibrous tissue (fascia), and is attached at each end, either directly or indirectly, to bones and other structures. The attachments are usually by means of firm, white, fibrous sinews or tendons. Each muscle is composed of masses of bundles, and each bundle is made up of a quantity of fine reddish fibres, only distinguishable under the microscope. Each muscle fibre has the power of contracting and extending. All the fibres in a muscle act together, and when they contract the whole muscle is shortened, and *vice versa*. It is this power of contraction and relaxation in the muscles which causes the movements of the body and the limbs. The end of a muscle which is attached to the fixed bone is called its "origin," and the end which is attached to the moving bone is called its "insertion." Between the origin and insertion of a skeletal muscle we find, as a rule, a joint in the bones (see Fig. 3). The muscular structures make

up the chief part of the bulk and nearly half the weight of the body. The skeletal muscles, upwards of 500 in number, are under the control of the will, and are termed "voluntary."

In addition to these, there are certain special muscles and groups of muscular fibres over which the will has no control, and they are termed "involuntary." Such involuntary fibres are found in the heart muscle, in the walls of the bloodvessels, in the muscular coats of the alimentary canal (œsophagus, stomach, bowels), in the walls of the windpipe and bronchial passages, of gland ducts, of the ureters and bladder, of the

FIG. 3.—SHOWING ACTION OF BICEPS.

1, Clavicle; 2, scapula; 3, humerus; 4, radius; 5, ulna; 6, short head of biceps; 7, long head of biceps; 8, body of biceps.

uterus and oviducts. They also occur in the deeper layers of the skin generally, surrounding the ducts of the sweat glands. All these act automatically, whether we wish it or not, whether we are awake or asleep.

Examined under the microscope, muscle is seen to consist of fine elongated cells or fibres. These are of two kinds, one being marked transversely by light and dark zones and called "striped" or "striated" muscle, the other being plain and called "unstriped" or "plain" muscle. The striped muscle fibres are found in the voluntary muscles, while unstriped muscle fibres are found in the involuntary muscles. The muscular tissue of the heart walls is an exception; though involuntary it

is faintly striped. Muscles are well supplied with blood-vessels to provide the nourishment required by their activity.

The functions of the muscles are: (1) To cause movement. For example, when a voluntary muscle is called into action by the will, acting through a motor nerve, it contracts; its fleshy

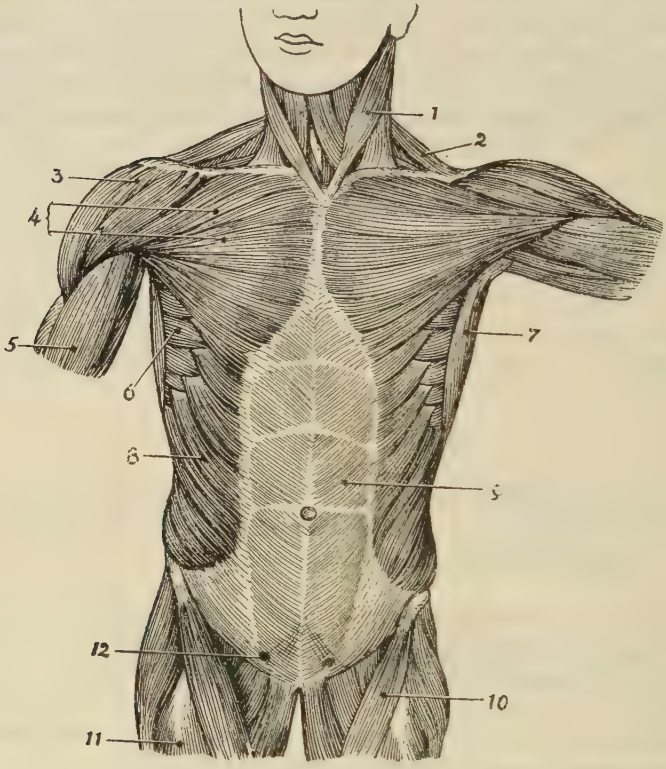


FIG. 4.—MUSCLES.

1, Sterno-mastoid; 2, trapezius; 3, deltoid; 4, pectoralis major; 5, biceps; 6, serratus magnus; 7, latissimus dorsi; 8, obliquus externus abdominis; 9, rectus abdominis; 10, sartorius; 11, rectus femoris; 12, external abdominal ring.

body thickens and shortens, drawing its two ends nearer together and so moving the bones to which they are attached. Conversely, when the muscle relaxes it allows the two ends to be drawn farther apart. Everyone is familiar with the muscle known as the "biceps," on the front of the upper arm (see

Fig. 3). The upper end, or "origin," is fixed in two places to the shoulder-blade, and the "tendon of insertion" is fixed to the radius, a bone in the forearm. When the biceps contracts, it swells and hardens in the middle, and it draws up the forearm till the hand is raised to the level of the shoulder. (2) To resist movement and cause rigidity—for instance, in clenching the jaws and teeth together—and in holding ourselves erect and firm

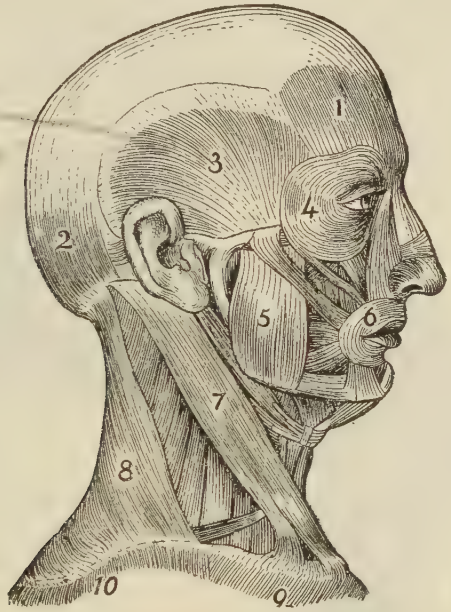


FIG. 5.—MUSCLES OF NECK AND FACE.

1 and 2, Occipito-frontalis; 3, temporal; 4, orbicularis palpebrarum; 5, masseter; 6, orbicularis oris; 7, sterno-mastoid; 8, trapezius; 9, pectoralis major; 10, deltoid.

It must not be forgotten that the muscles are elastic, and so, when one set of muscles acts, as in bending the elbow, another opposing set is being relaxed.

Those muscles which bend a limb are called "flexors," those which straighten a limb are called "extensors"; while muscles which draw a limb towards the trunk are called "adductors" (Latin *ad*=to, and *ductus*=drawn), and those which move a limb outwards and away from the trunk are "abductors" (*ab*=away from). (Compare joints, p. 48.) A few muscles in the face are

attached to the skin and produce the movements of expression.

The names and positions of some of the principal voluntary muscles are seen in Diagrams 4 and 5, pp. 36 and 37.

BONE AND ITS FUNCTIONS.

If we saw or break through any bone, it will be seen that the outside layers of it are hard and compact, like ivory, while the inner part is more or less open in structure (see Fig. 6). It is well known that a hollow iron pillar, while lighter, may be as strong as a solid one of the same thickness, and so it is with

FIG. 6.—LONGITUDINAL SECTION THROUGH THE UPPER END OF THE FEMUR, SHOWING COMPACT AND CANCELLATED BONY TISSUES.

bone. If the bones were compact all through they would be of much greater weight (and would therefore require more exertion to move them) and yet be no stronger, while the existing arrangement allows for nutrition and growth by affording storage room for the bone marrow.

The functions of bone are: To form a framework on which the body is moulded; to support the softer structures in their proper places; to keep all parts connected and braced together; to protect internal structures from injury; and to enable the body and limbs to be moved in various directions by the actions of the muscles.

In the skeleton or bony framework there are over 200 bones. There are four different kinds: (*a*) long bones; (*b*) short bones; (*c*) flat bones; (*d*) irregular bones. The most important of the long bones are to be found in the limbs, and the ribs also belong to this class. Each consists of a shaft and two ends. The shaft is composed of dense hard bone with a hollow running through the centre. The two ends are shaped to form the joints, and are filled with a spongy or honeycomb-like arrangement of bone tissue, the "cancellous tissue." Of short bones we have examples in the small bones of the wrist, ankle, foot, and face. The flat bones are seen in the innominate bone (or haunch bone), the scapula (or shoulder-blade), and the bones forming the vault of the skull. Some bones, such as those of the spinal column, are called "irregular bones." The short bones and irregular bones contain a good deal of cancellous tissue. In the cancellous tissue is found a soft substance called **red marrow.** It is very vascular (rich in bloodvessels), and in it both red and white blood corpuscles are formed. A yellowish marrow, consisting largely of fat cells, fills the shafts of the long bones.

All bones, in the living state, are enveloped by a thin, tough membrane called the **periosteum,** which helps in the formation and growth of new bone cells.

Bone tissue consists partly of organic or animal matter and partly of earthy or mineral matter. The earthy matter (mostly phosphate and carbonate of lime) gives it hardness and solidity, while the animal matter preserves it from becoming too brittle. In an infant there is much less earthy matter present, and thus the bones may be bent and twisted by injury or stress, whereas in later life the earthy constituents predominate more and more, and so the bones become more brittle and liable to fracture.

CARTILAGE.

Cartilage is popularly called gristle, and is closely associated with bone.

There are two chief varieties: (1) Fibro-cartilage, which is

pervaded by connective-tissue fibres. (2) Hyaline cartilage, which is clear and free from fibres.

Fibro-cartilage is found in the semilunar cartilage within the knee-joint, in the intervertebral discs, in the external ear, and in the epiglottis.

Hyaline cartilage is found in the nose, the trachea or windpipe, the costal or rib cartilages, and covering the ends of bones at the joints, where it is called articular cartilage.

A few bones, such as those of the vault of the skull, are developed out of fibrous membranes, but by far the greater number are developed from cartilaginous tissue. In the case of the long bones, the shaft and the two ends are all ossified separately, and a small intervening layer of cartilage generally persists until the individual reaches the age of fifteen to twenty years. These ends are called "epiphyses." The active growth which takes place in a long bone during childhood occurs at these cartilaginous areas.

THE SKULL.

The bones of the head form what is called the skull. It is made up of twenty-two separate bones, of which eight belong to the **cranium** and fourteen to the **face.** The cranium is that part of the skull which encloses and protects the brain in a sort of hollow, rounded box.

The cranial bones are the **frontal,** forming the forehead; the two **temporals,** at each side about the ears; the two **parietals,** completing the sides and the dome of the vault of the skull; the **occipital,** forming the back and part of the floor of the skull; and the **sphenoid** and **ethmoid,** which form the centre and front of the floor.

The most important bones of the face to remember are the two **nasals,** forming the bridge of the nose; the two **malar,** or cheek-bones, one on each side; the **superior maxilla,** or upper jaw, which contains the upper teeth; and the **inferior maxilla,** or **mandible,** forming the lower jaw, which contains the lower teeth. It is convenient to call the upper jaw the maxilla and the lower jaw the mandible.

Teeth are fixed in sockets in the lower and upper jaw by means of one or more peg-like roots. The greater part of a tooth consists of **dentine,** which is covered over by an exceedingly hard and rather brittle white shell, the **enamel.** In the very

centre is a mass of **pulp,** which contains nerves and bloodvessels. In a grown-up person with a complete set, there are thirty-two teeth, eight on each side above and below. The upper row consists of four **incisors** in the centre, sharp and chisel-shaped; on each side of the incisors is one pointed **canine**; next to the canines are two **pre-molars**; then three **molars** on each side. The bottom row is placed in the same way: each upper tooth has a similar one opposite to it. Altogether there are eight incisors, four canines, eight pre-molars, and twelve molars. The

FIG. 7.—THE SKULL.

I, Frontal; II, parietal; III, occipital; IV, great wing of sphenoid; V, squamous portion of temporal; VI, mastoid portion of temporal; VII, zygoma; VIII, malar; IX, nasal; X, superior maxilla; XI, mandible.

incisors and canines are for cutting and tearing purposes; the pre-molars and molars, with their broad and ridged tops, are for grinding the food. The so-called **wisdom teeth** are the back molars. The first teeth of childhood, or **milk teeth,** drop out by degrees after the age of seven or eight, and are replaced by the **permanent teeth,** which do not grow again if extracted. Bad and broken teeth lead to insufficient grinding of the food, which is thus imperfectly prepared for digestion in the alimentary tract; moreover, particles of food lodge in the cavities and decompose, causing a foul and septic condition of the mouth. Good teeth are therefore very important for sound health.

THE VERTEBRÆ.

The skull rests on the upper end of the spinal column. The spinal column, or backbone, also known as the **vertebral column,** is the principal support of the body. It consists of thirty-three small bones called **vertebræ,** which are joined together to form a flexible column.

The upper twenty-four vertebræ are jointed in a movable manner. The next five are welded together into one piece, called the **sacrum.** The remaining four are very small, and are attached to the lower end of the sacrum. They form the **coccyx,** which represents the remnant of the tail of the lower animals.

The vertebræ are strongly bound together, but intervening pads of cartilage allow sufficient play to leave the spinal column

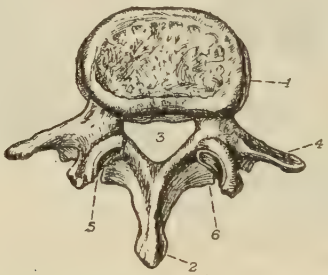


FIG. 8.—THE THIRD LUMBAR VERTEBRA (FROM ABOVE).

1, Body; 2, spine; 3, spinal canal; 4, lateral process; 5, articulates with the next vertebra above (second lumbar); 6, articulates with the next vertebra below (fourth lumbar).

flexible and elastic. A small degree of movement between each separate vertebra permits fairly free bending and twisting of the whole column formed by the upper twenty-four vertebræ. These occupy three regions—the neck, the thorax, and the loin. In the neck there are seven, the **cervical** vertebræ. Twelve, the **thoracic** vertebræ, are in the thorax; and five **lumbar** vertebræ in the loin region. The vertebræ belong to the group known as "irregular" bones. Each vertebra consists of a body from which two plates of bone project backwards, and join together to form a sort of ring (Fig. 8). These rings, placed one above the other, form a tunnel (the spinal canal), in which lies the spinal cord. The two uppermost cervical vertebræ are specially con-

structed to allow free rotation of the head. The second is known as the **axis,** and has a peg-like projection, against which the first cervical vertebra, or **atlas,** can rotate. The skull rests on the atlas. The thoracic vertebræ, together with the ribs, the costal cartilages, and the breast-bone, enclose the chest in a strong protecting frame.

To either side of each of the twelve thoracic vertebræ is attached the hinder end of a rib. There are thus twelve pairs of ribs. Each rib curves round outwards, downwards, and forwards, then turns inwards again in front. The upper ten ribs are united to the breastbone, or **sternum,** in front by means of strips of cartilage, the **costal cartilages.** The upper seven are called "true" ribs, their cartilages being joined directly to the

FIG. 9.—THE PELVIS.

1, Ilium; 2, pubis; 3, ischium; 4, sacrum; 5, coccyx; 6, anterior superior spine of ilium; 7, acetabulum; 8, symphysis pubis; 9, crest of the ilium.

sternum. The remaining five are called "false" ribs. The ends of the eighth, ninth, and tenth ribs are united by cartilage to the costal cartilage of the seventh true rib above them. The eleventh and twelfth ribs are shorter, and have no fixed end in front, and are called the "floating" ribs.

The costal cartilages are more yielding than the bony ribs, and aid free expansion and contraction of the chest.

The five lumbar vertebræ have no ribs or other lateral bony attachments, and form the "small" of the back.

The **sacrum,** or rump, consists originally of five distinct vertebræ, but they become fused together quite early in life into one single piece. It enters into the formation of the pelvis.

The Pelvis.—Pelvis is the Latin word for basin, and the human pelvis, as the name implies, is basin-shaped, formed

by a strong girdle of bone, the two innominate bones, one at each side, and the sacrum behind, all immovably joined together. The floor is formed by fibrous and muscular tissues.

The **innominate bones** (haunch), are large, rather curved, flat bones. Each is united to its fellow in front and to the sacrum behind. In the outer and lower side of each is a deep cup or socket called the **acetabulum,** into which the head of the thigh-bone fits, forming the hip-joint. They constitute the larger and more prominent part of the pelvis, and each really includes three bones which are separate in early life, but are fused together into one bone in adult life. These three parts of the innominate bone are: (1) The **ilium,** forming the large upper part, which can be easily felt under the skin. The upper curved margin of this is called the **iliac crest,** and the prominent anterior end of the crest is termed the **anterior superior spine** of the ilium. (2) The **ischium,** which forms the lower portion of the haunch-bone and lies towards the back. Part of it is known as the **ischial tuberosity.** It is upon these tuberosities that the weight of the body is supported when we sit. (3) The **os pubis,** which forms the anterior margin of the pelvic basin. It is united to the ilium by a bridge of bone and to the ischium by another bridge. Lying between these bridges is a foramen or opening which is covered over by a dense membrane. The pubic bone of the one side joins its fellow of the other side in the middle line in front, and forms the **symphysis pubis.** The deeper part of the pelvis, below the level of the brim formed by the upper margin of the two pubic bones and a prominent ridge running round the inner aspect of the two iliac bones, is called the **true pelvis,** while the upper portion, bounded at the sides by the large wings of each ilium, is spoken of as the **false pelvis.**

THE LIMBS.

There are two upper and two lower limbs, the arms and legs. These appendages of the human body are chiefly for the purpose of locomotion (the lower limbs) and of handling and grasping (the upper limbs). They are not essential to life. Many people can live and work efficiently and happily lacking one or more limbs, or provided with artificial substitutes. There are cases on record where a man has been deprived of all four limbs and remained otherwise healthy.

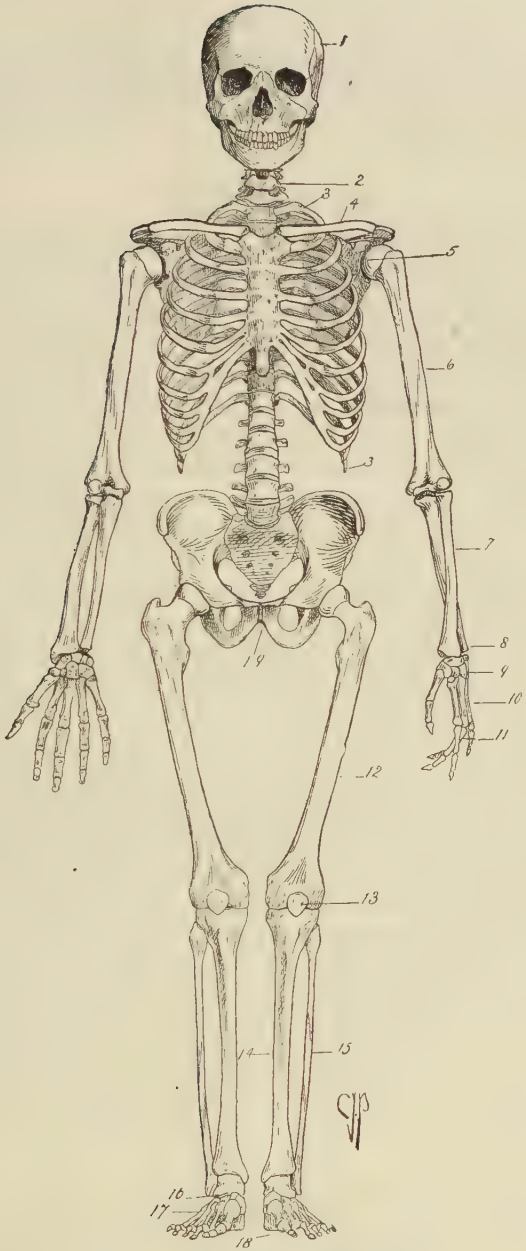


FIG. 10.—SKELETON: FRONT VIEW.

1, Cranium; 2, cervical vertebræ; 3 to 3, ribs; 4, clavicle; 5, scapula; 6, humerus; 7, radius; 8, ulna; 9, bones of carpus; 10, bones of metacarpus; 11, phalanges; 12, femur; 13, patella; 14, tibia; 15, fibula; 16, bones of tarsus; 17, bones of metatarsus; 18, phalanges; 19, symphysis pubis.

The limbs are principally composed of bone and muscle, but also have the requisite supply of bloodvessels, lymphatics, nerves, and the covering skin.

The Upper Limb.

In describing the upper limb we generally include the whole shoulder, and divide the limb into three regions, the upper arm, forearm, and hand (which includes the wrist).

The **scapula,** or shoulder-blade, is a large, rather flat, triangular bone, the upper, outer angle of which is enlarged, ending in a shallow cup, the **glenoid cavity.** This cup is the socket in which the knob or head of the humerus rests. On the back of the scapula there is a prominent ridge which serves chiefly for the attachment of several large muscles. The scapula is connected with two other bones, the humerus, mentioned above, and the clavicle.

The **clavicle,** or collar-bone, is a long, rather slender bone with a sort of knob at one end and a flattened bulge at the other. The knobbed inner end is attached to the top of the breast-bone, and the outer, flattened end is attached to a projection on the scapula. It thus helps to hold the scapula in place.

Humerus.—There is only one bone in the upper arm. This is a long bone extending from the shoulder to the elbow. It consists of a shaft with a large rounded head which articulates with the socket of the scapula; the lower end is broadened and shaped to articulate with the two bones of the forearm.

The **ulna,** a long bone, is the larger of the two bones in the forearm. The upper, or elbow end, is shaped to fit round the lower end of the humerus. The lower end is smaller, and is attached to the inner, or little-finger side, of the wrist.

The **radius** is the other long bone in the forearm. The upper end has a button-like top which rests against the foot of the humerus; the lower end is broadened to form an attachment for the wrist. It is also attached to the ulna at both ends.

The **hand** consists of three parts—the **wrist, palm,** and **fingers.** The wrist is formed by eight small bones arranged in two rows and called the **carpal bones.** In the palm of the hand there are five long bones from the wrist to the knuckles, called the **metacarpals.** Each of the free portions of the fingers consists of three

bones extending from their respective metacarpals and called the **phalanges.** The **thumb** differs from the four fingers in having only two phalanges.

The Lower Limb.

In general style of structure this resembles the upper limb. It is in three parts, the thigh (extending from the hip to the knee); the leg (extending from the knee to the ankle); and the foot. The **femur,** or thigh-bone, is a very strong, long bone with a much bigger head than the humerus. This head has a well-defined neck connecting it with the shaft (see Fig. 6), and rests in the deep cup formed by the **acetabulum** in the haunch-bone at the hip-joint. The lower end of the femur is broad, and rests on the head of the **tibia.**

Though the whole lower limb is often spoken of as the leg, this term should, strictly speaking, be used for that portion extending from the knee to the ankle. It has two bones, the tibia and the fibula.

The **tibia** (shin-bone) is a strong, long bone forming the shin of the leg. The upper end is very broad, to support the femur at the knee-joint.

The **fibula** is a very slender, long bone on the outer side of the leg. Its name (Latin, *fibula* =a brooch) arises from the use of this slender bone from smaller animals in making the simple ring-and-pin brooch of the ancients. The upper end rests against the head of the tibia, somewhat to the back, and lower down than the knee-joint. The lower ends of both the tibia and fibula are enlarged, and form the prominences at each side of the ankle, the internal and external malleolus respectively. The **patella** is a small, flat, somewhat triangular bone forming the "knee-cap." It is held in place by strong ligaments, and forms a protection for the front of the knee-joint.

The Foot.—The foot, like the hand, consists of three parts—**tarsus, metatarsus, phalanges.** There are seven tarsal bones; the heel is formed by the largest of these, the **os calcis.**

There are five **metatarsal** bones; beyond these are the **phalanges** of the toes, three to each toe except the big toe, which, like the thumb, has only two. The tarsal bones of the foot are much larger and stronger than the carpals of the hand, but the phalanges of the toes are shorter and more squat than those of the fingers.

JOINTS.

At the places where bones are attached to one another we have joints (articulations).

These may be movable or immovable.

The bones of the skull, for instance, are dovetailed together in a fixed and immovable manner. Between the bones of the vertebral column there are no proper joint movements; they should therefore be correctly termed immovable joints. But there is a thick pad of cartilage between each vertebra, which, by its elasticity, allows of some range of movement, the effect of which is seen in the manner in which we can bend and twist the whole column.

In the movable joints the movement is rendered possible by the placing together of two free surfaces of bone, covered over with a firm, polished **articular cartilage** and a smooth, glistening **synovial membrane,** which is kept lubricated by a fluid, the **synovial fluid.** The bones are bound together and prevented from dislocation by strong fibrous bands—**ligaments.** Some joints have a wider range of movement than others. Those with the greatest range are the **ball-and-socket joints,** such as the shoulder and hip. Next in order of freedom of movement are the **hinge-joints,** which, like a hinge, can move to and fro in one direction, such as the knee and elbow. A third kind of movable joint is where the surfaces glide over one another, as in the joints between the small carpal bones and between the tarsal bones; these are called **gliding joints.** The joint between the axis and atlas at the top of the vertebral column, whereby the head is moved, is sometimes called a "pivot" joint, but it is really only a form of gliding joint.

The following table of joints illustrates their characters:

	Name of Joint.	*Movement.*
I. **Immovable:**		
(1) Saw-edge	Bones of skull	
(2) Cartilage-pad	Vertebral column	
II. **Movable:**		
(1) Gliding	Carpus and tarsus	Gliding.
(2) Hinge	Elbow, knee, wrist, ankle, fingers, and toes	Flexion and extension.
3) Ball - and - socket	Shoulder, hip (to some extent the lower jaw and metacarpal joint of the thumb)	Flexion, extension, abduction, adduction, circumduction, rotation.

It will be noticed that hinge-joints save muscular power and act on the principle of a lever, but have much less freedom of movement than ball-and-socket joints.

MOVEMENTS.

The movements which take place at the joints are of several kinds. Thus, the knee can be bent or straightened, these actions being called **flexion** and **extension;** or the part, as at hip-joint or shoulder, may be moved outwards from the middle line of the body, **abduction;** or back again towards the middle line, **adduction;** or, by a combination of these four movements, a wide sweeping circle may be made, **circumduction,** as when one swings the arm round in bowling overhand at cricket. A long bone may be made to turn on its long axis in a movement called **rotation.**

Lastly, the movements of the radius in relation to the ulna receive special names. With the arm hanging by the side and the palm of the hand looking backwards, the radius is crossed over the ulna, and the hand is said to be **prone**—movement of the forearm to bring this about being called **pronation.** When the forearm is turned so that the palm looks forward, the ulna and radius are side by side, and the hand is said to be **supine**—the movement being called **supination.**

The "origin" and "insertion" of muscles have already been referred to on p. 34. In the case of a movable joint these points are on opposite sides of the joint. For instance, when raising the arm at the shoulder, the origin of the principal muscle (the deltoid) is on one side of the shoulder-joint, being attached to the clavicle and scapula, and the insertion is on the other side, attached to the humerus.

Muscles working in combination, and moving several joints simultaneously in conjunction, accomplish many varieties of movement, such as walking, running, stooping, jumping, swimming, writing, speaking, etc.—in fact, everything we do.

The muscles are not only used to move joints, they may act in resisting movement and in keeping a joint rigid (as in holding the arm out straight). The act of standing, while not a movement, is a muscular act, for without the counteraction between antagonistic groups of muscles which keep the parts braced, we

could not preserve our balance, and it would be impossible to remain in the erect position. The movements of the face in expression depend only on muscles, and do not affect any joint.

BODY CAVITIES.

Though these are known for convenience as the body cavities, it must be borne in mind that they are not empty, but are filled by the various structures they contain.

The **body** consists of a trunk, head, and limbs.

The **trunk** is really a receptacle or case inside which all the vital organs are contained, with the exception of the brain. It consists of two parts—the thorax, or chest, and the abdomen, or belly. This receptacle is walled round partly by bony structures and partly by muscle.

The upper part, the **thorax,** is surrounded by a bony framework; the spinal column behind, the ribs curving round the sides to join the costal cartilages, and the sternum, or breastbone, in front.

The lower part of the trunk, called the **abdomen,** is likewise supported by the spinal column behind, but the side and front walls are formed by strong muscles and fibrous tissue (Fig. 4). The lowest part of the abdomen, the pelvis, is protected by the bony walls of the pelvic girdle (Fig. 10). At the level of the lower ribs there is a sheet of muscle, called the **diaphragm** or midriff, arching right across the trunk and dividing the upper part from the lower. These two divisions—the thorax above and the abdomen below—are known as the body cavities.

Thorax.—The principal structures contained in the thorax are the **heart,** surrounded by a membranous envelope called the **pericardium,** the **lungs,** enveloped by the **pleura,** the **bronchi,** the **œsophagus,** which passes through it to reach the stomach in the abdomen, the upper part of the **aorta,** and the **thoracic duct.**

Abdomen.—The principal structures in the abdomen are the **stomach, intestines, liver, spleen, pancreas, kidneys, adrenal glands,** the lower part of the **aorta,** and in the pelvis the **bladder.** In woman the pelvis also contains the **uterus,** or womb, and the **ovaries.**

The abdomen is lined by a special fine membrane, the **peritoneum,** which covers the important organs and supplies folds

to envelop the outer walls of the stomach and small intestine. The kidneys and adrenal glands are not enclosed by it, but lie behind it, while the bladder lies below it. The **mesentery** is a broad web of fine tissue which attaches the small intestine throughout its length to the posterior wall of the abdomen, and in this are found the **bloodvessels, lymphatics,** and **nerves** for the small intestine.

In addition to the above large organs the thorax and abdomen both contain many bloodvessels, lymphatic vessels, lymphatic glands, nerves, and some other structures.

The **skull** is also a cavity, containing the **brain,** but this will be dealt with under the Nervous System in a separate section.

SURFACE ANATOMY.

By this is meant the relation of the deeper structures to the principal surface markings of the body. It is, of course, best learnt by practical demonstration on the living subject.

There are certain easily recognised "landmarks" on the surface, such as the **umbilicus,** or navel, the **nipples,** and some of the larger **bony prominences.**

THORAX.—Taking first the surface relations of the thoracic organs, the most prominent bony eminences are the **ribs**, and, behind, the tips of the **dorsal vertebræ.** The **nipple** may vary somewhat, but usually lies over the space between the fourth and fifth ribs, commonly called the fourth costal interspace. The **diaphragm** constitutes the division between the thorax and abdomen; during ordinary inspiration the highest part is about on a level with the fifth rib on the left side and the fourth rib on the right side.

The Heart.—The apex corresponds to a point in the fifth left costal interspace, 1½ inches below and slightly to the inner side of the left nipple. The upper limit is about the level of the second costal interspace; the right border lies 1½ inches from the midline of the body, and the left border runs obliquely from the apex up to a point in the second left interspace about 1 inch outside the sternum (see Fig. 12).

The Lungs and Pleura.—The apex of each lung, with its pleural covering, lies in the root of the neck, 1½ inches above the level of the clavicle. The anterior margin of each passes downwards and inwards behind the breast-bone. The lower

margin of the left pleural sac, at the level of the fourth costal cartilage curves downwards and outwards to the level of the eighth rib. On the right side it does not begin to sweep outwards till the level of the sixth costal cartilage. The lower margin of each passes horizontally across the back at the level of the twelfth dorsal vertebra. The lower margin of each lung varies with the respirations, but is generally about 2 inches higher than the lower margin of the pleura.

ABDOMEN.—The chief landmarks of the abdomen are the bony prominences of the pelvis, the lower border of the ribs and costal

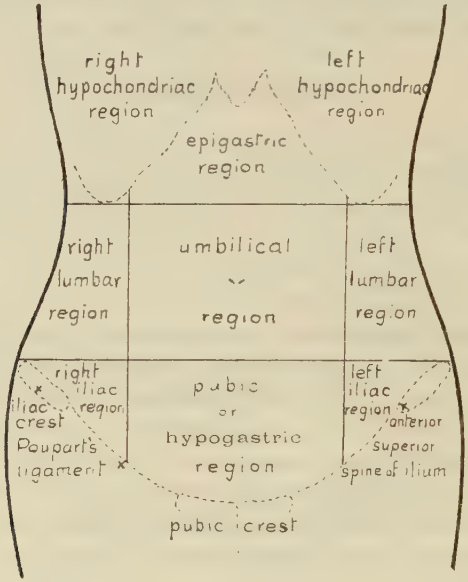


FIG. 11.—DIAGRAM OF THE REGIONS OF THE ABDOMEN.

cartilages, and the umbilicus. There is also a straight, strong ligament, known as Poupart's ligament, running down each groin from the anterior superior spine of the ilium to the pubic spine. At its lower end is a small opening in the fascia, called the external abdominal ring. For convenience of description, the anterior abdominal wall is artificially divided up by drawing a horizontal line across the iliac crests, and a second across the level of the lowest part of the tenth costal cartilages, and two vertical lines, each from the middle of Poupart's ligament. In this way the abdomen is mapped out into nine regions or

sections, called the **epigastric, umbilical, hypogastric,** right and left **hypochondriac,** right and left **lumbar,** and right and left **iliac,** as will be seen in the diagram (Fig. 11).

Stomach.—The cardiac end, or entrance, lies behind the seventh left costal cartilage. The pyloric end, or exit, is near the mid-line, about 4 inches below the cartilaginous tip of the breast-bone.

The **duodenum** lies approximately in the upper half of the umbilical region.

The **cæcum** occupies the right iliac region. The **vermiform appendix** is attached to it, and lies about midway between the umbilicus and the centre of Poupart's ligament.

The **colon** ascends in the right lumbar region, and crosses just above the level of the umbilicus, to descend in the left lumbar and iliac regions.

The **liver** occupies the right upper portion of the abdomen, under the ribs and crossing the epigastric region.

The **spleen** lies under cover of the ninth, tenth, and eleventh ribs on the left side of the back.

The **kidneys** are at the back of the abdominal cavity. The upper end of the right kidney is crossed by the twelfth rib and the upper end of the left kidney by the eleventh rib.

The **bladder** lies in the pelvis, behind the symphysis pubis, but if distended it may rise considerably above the level of the pubis.

THE BLOOD.

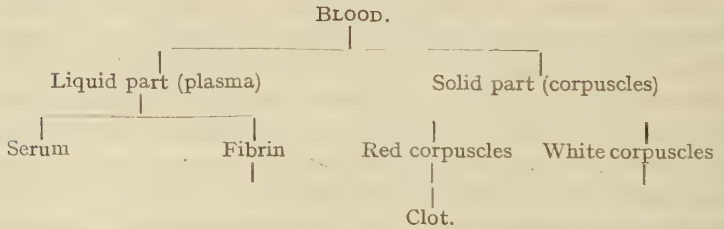
Blood consists of cells floating in a fluid called plasma, which by itself is straw-coloured, though the blood is red. Blood cells, or **corpuscles,** are of two kinds—red cells, which give the red colour to the blood, and white cells. In the healthy state there are about 500 red cells to every white one. The **red cells** are the oxygen-carriers, and the bright red colour of the blood depends on the presence of oxygen in these cells. They take up oxygen in the lungs and carry it through the body to supply the other tissues. When giving up oxygen they assist the plasma in taking up carbonic acid gas, which is one of the waste products of tissue activity, and when the blood gets round to the lungs again this is given off and fresh oxygen is taken up. The red blood cells are very tiny disc-shaped bodies. It is

estimated that it would take ten millions of them to cover a square inch. In health they are all alike in size and appearance.

There are several different kinds of **white corpuscles** or **leucocytes.** The most important feature of the leucocytes is that they are capable of amœboid movement, and can engulf and digest foreign particles and bacteria which may invade the blood and tissues; for this purpose they can leave the blood-stream in the capillaries and penetrate into the intercellular lymph spaces.

The fluid part of the blood, called the **plasma,** contains much nourishment in solution. It is really a liquid store for all the tissues, from which they draw what building-up material they require, and it derives this nourishment from the alimentary tract after the food has been digested and absorbed. Dissolved in the plasma are certain protein substances, **serum albumin** and **serum globulin, fibrinogen,** also various **salts** of lime and potash. The blood coagulates very rapidly when exposed to air, as in a cut. The exact mechanism of this clotting process is not clearly understood, but sufficient is known to show that an **enzyme** or ferment is developed which acts upon the fibrinogen, leading to the formation and deposit of fine threads of **fibrin.** The resulting meshwork becomes rapidly denser and entangles corpuscles in the clot. At first the clot is soft and jelly-like, but it rapidly becomes much firmer, and seals down the cut surface or blocks the bloodvessel, as the case may be.

The following table shows the composition of blood and the formation of a clot:



CIRCULATORY SYSTEM.

This is the mechanism by which the blood is conveyed throughout the body It consists of a muscular pump, the **heart,** and a system of elastic tubes, the **bloodvessels.** The object of the

circulation is to send blood containing oxygen and nourishment to all the tissues, and to bring back blood carrying carbonic acid gas and other waste products. The centre, the beginning, and the ending of the circulation is the heart.

The **heart** is hollow, and its walls are composed entirely of involuntary muscle fibres. When these contract they drive out the blood; when they relax the heart expands and fills again with blood, in a manner similar to that in which a rubber ball can be emptied and filled when squeezed and allowed to expand again.

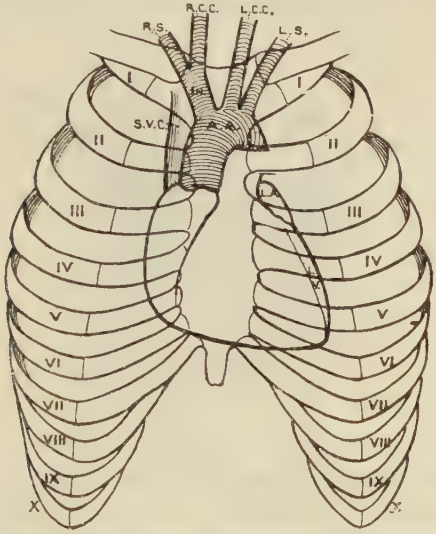


FIG. 12.—DIAGRAM SHOWING THE POSITION OF THE HEART IN RELATION TO THE ANTERIOR WALL OF THE THORAX.

A.A., Arch of aorta; S.V.C., superior vena cava; IN., innominate artery; R.S., right subclavian artery; R.C.C., right common carotid artery; L.C.C., left common carotid artery; L.S., left subclavian artery; L.A., left auricle; L.V., left ventricle.

The heart lies in the thorax, close behind the sternum between the two lungs, but more towards the left side (see Fig. 12). It is covered by a membranous envelope, the **pericardium.** It weighs about nine ounces, and is somewhat pear-shaped; its size is about that of the closed fist of the person concerned. The broader end or **base** is upwards, and the tip or **apex** points downwards towards the left. This apex can be felt beating between the fifth and sixth ribs, about $3\frac{1}{2}$ inches to the left of the middle line on the front of the chest.

On cutting into the heart we find that it is divided into four chambers or cavities (Fig. 13). These are placed two above, the **auricles,** and two below, the **ventricles.** If we look at the section (Fig. 13), we see that a partition wall of muscle separates the heart into a right half and a left half, quite closed off from each other. Each side is divided into an auricle above and a ventricle below, and each of these cavities has its own duties to perform. The blood from the right side of the heart is driven to the lungs only—**pulmonary circulation** ; from the left side of

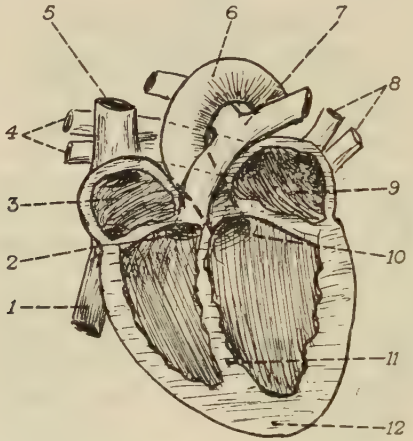


FIG. 13.—DIAGRAMMATIC VIEW OF THE INTERIOR OF THE HEART.

1, Inferior vena cava; 2, pulmonary orifice; 3, right auricle; 4, right pulmonary veins; 5, superior vena cava; 6, arch of aorta; 7, pulmonary artery; 8, left pulmonary veins; 9, left auricle; 10, aortic orifice; 11, interventricular septum; 12, apex.

the heart it is propelled through all the rest of the body—the **systemic circulation.**

The **auricles** serve as reservoirs for the accumulation of blood required for each beat. When filled they drive their contents into the ventricles. The **ventricles** are more muscular, and act as strong force-pumps, driving the blood out into the large arteries. The heart thus consists of two reservoirs and two force-pumps. Like a pump, each side is fitted with valves to prevent a backward flow of blood. So long as the valves are healthy and acting properly the blood can only be driven in one direction, and there is no backward flow.

The **valves** consist of membranous flaps, which are pressed open by blood coming from behind them, but meet together again, closing the orifice to prevent any backward flow in the reverse direction. There are four sets of heart valves. The **mitral** valve is between the left auricle and left ventricle, the **tricuspid** valve is similarly placed on the right side; and each of the two large bloodvessels (aorta and pulmonary artery) emerging from the heart has a valve for the similar purpose of preventing backward flow. The direction of the blood-stream, therefore, is constantly in the one forward direction, but as it

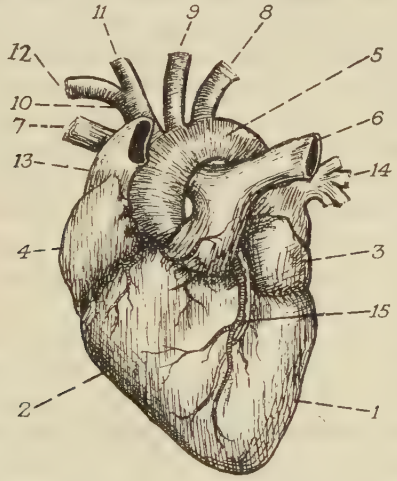


FIG. 14.—DIAGRAM OF HEART (FROM THE FRONT).

1, Left ventricle; 2, right ventricle; 3, left auricle; 4, right auricle; 5, arch of aorta; 6, left pulmonary artery; 7, right pulmonary artery; 8, left subclavian artery; 9, left common carotid artery; 10, innominate artery; 11, right common carotid artery; 12, right subclavian artery; 13, superior vena cava; 14, left pulmonary veins; 15, coronary artery and vein.

comes round again eventually to the original starting-point, it has been given the name of " the circulation." The flow ceases only at death.

The flow of blood in the body, to and from the heart, is conducted along the bloodvessels, a system of tubes which divide and subdivide into smaller and smaller branches the further one gets from the heart. This has been compared to the water supply of a town or district, pipes beginning with a " main "

issuing from the reservoir, then dividing into district branches, then into street branches, and lastly into the smallest branches of all, the house branches.

Bloodvessels are partly composed of involuntary muscle fibres, and are therefore able to dilate or contract and so help in regulating the force and amount of the blood-stream. There are three kinds of bloodvessels—namely, arteries, veins, and capillaries. The **arteries** all lead blood away from the heart towards the tissues; they branch again and again into smaller and smaller arteries and arterioles and end in capillaries. The **veins** all lead blood towards the heart; they start in the capillaries and, running together, join to form large veins, until at last near the heart there are only six, two entering the right side and four entering the left side. The **capillaries** are very minute, hair-like vessels, which form a meshwork in all parts of the body, and are the connecting-link between the arteries and the veins. Their walls are so thin that it is possible for substances in solution to filter through them into and out of the blood, thus either carrying nourishment into the tissues or extracting waste material from them. As stated above, the whole object of the circulatory system is to carry, dissolved in the blood, a supply of food and fuel to all parts of the body, and to bring back in a similar manner the used-up and refuse materials with a view to removing them from the body. There is no part of the body that is not supplied and drained by the blood-stream.

It has already been explained that the force which propels the blood is the muscular contraction of the heart. In a healthy heart contractions take place rhythmically at regular intervals, and with regular force, and drive the blood-stream, a certain quantity at a time, in successive waves through the arteries. These waves can be felt by placing a finger on one of the arteries —*e.g.*, at the wrist in front of the lower part of the radius. Every volume of blood pumped by the heart into the elastic arteries produces a fresh wave or beat. This is the **pulse.** The rate of the pulse-beats varies somewhat in different individuals; but the average number of beats or waves per minute is about seventy for a man and eighty for a woman.

The course of the circulation, its object and the direction followed, can be best understood by studying the diagram (Fig. 15), which shows in a rough-and-ready way the relationship between the heart and the bloodvessels. Starting (for con-

venience of description) at the left auricle, where it enters the heart from the four large pulmonary veins, the blood passes through the mitral valve into the left ventricle. When the ventricle is full the ventricle contracts and the valve closes, driving the blood through the **aortic valve** into the aorta, which is the largest artery in the body, and carries the blood from the heart to all parts of the body. The **aorta** arches upwards and backwards from right to left, then downwards through the thorax. At the arch it gives off branches to carry blood to the head and upper limbs. It enters the abdomen under the name

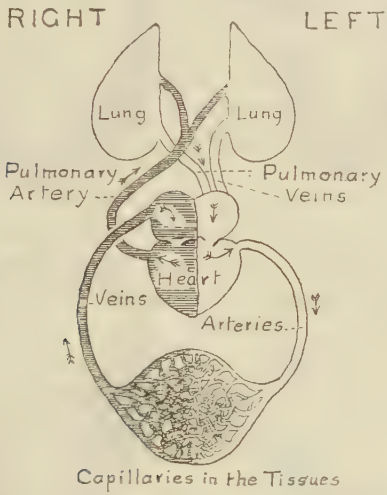


FIG. 15.—DIAGRAM OF THE CIRCULATION.

of the **abdominal aorta,** giving off branches to the abdominal organs, and dividing opposite the third lumbar vertebra into two branches, the **iliac arteries,** which send branches to supply the lower extremities. After passing through the smaller arteries and capillaries, the blood begins to return towards the heart through the veins. Coming from the veins of the legs there are the **iliac veins,** which unite to form the **inferior vena cava ;** this runs up on the right of the aorta, receiving veins, either directly or indirectly, from the abdominal organs on its way, and ends by opening into the right auricle. The veins from the upper limbs and head and neck join to form the **superior vena cava,** which also opens into the right auricle.

The blood is now entering the heart once more, only this time at the other side. From the right auricle it enters the right ventricle, through the **tricuspid valve,** and is then driven out through the **pulmonary valve** into the **pulmonary artery.** This artery divides into two large branches, one to each lung, and the

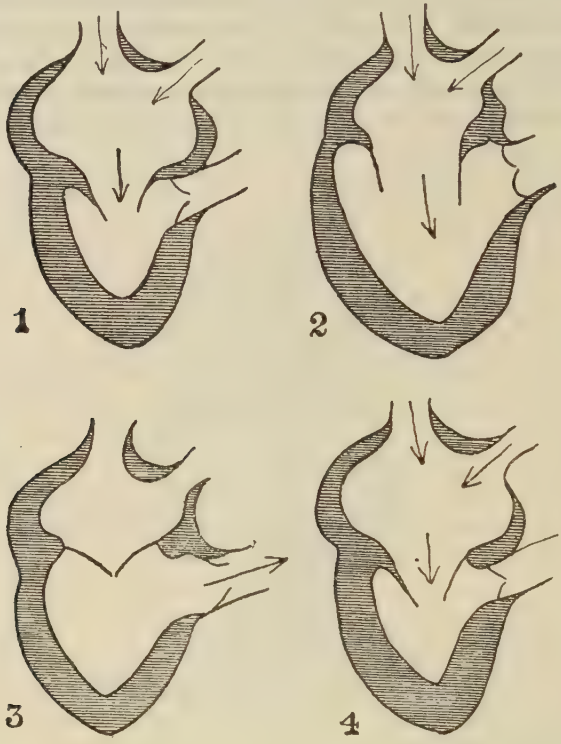


FIG. 16.—DIAGRAMS OF THE HEART'S ACTION.

1, Auricle filling, aortic valve closing; 2, auricle begins to contract, driving contents into ventricle; mitral valve well open; 3, ventricle begins to contract, driving contents into aorta; aortic valve open, mitral closed; 4, cycle recommencing as in No. 1.

blood coming through the vessels from the right side of the heart goes only to the lungs. The pulmonary arterial branches break into smaller vessels in all parts of the lungs and end in capillaries. Every air cell in the lungs has capillary blood circulating in its walls. At this point the blood becomes aerated by coming into contact with the air, giving off carbonic acid gas and taking

up oxygen (see Respiration). From the capillaries it again flows into veins, which join to form the large **pulmonary veins,** two from each lung, four in all. These carry the blood back into the heart at the left auricle, where we began the description, thus completing one full circuit of the circulation (Fig. 16).

We thus see that the blood passes twice through the heart, once on the left side and once on the right side. In tracing this journey we began and ended at the left auricle, but any other point might equally well have been chosen.

We see, therefore, that in one full circulation there are two lesser circulations, a short one through the lungs and a longer one through the rest of the body (the pulmonary circulation and the systemic circulation respectively). The object of the **pulmonary circulation** is to purify the blood of waste carbonic material removed from the other tissues and to replenish it with oxygen. The object of the **systemic circulation** is to convey oxygen and other necessary fuel and nourishment to all the tissues, organs, muscles, bones, etc., and to bring back from them most of the waste and refuse which would otherwise accumulate in them. The blood is not entirely purified in the lungs, nor does it give off all its waste products in them. The special means whereby other nourishment enters the blood and other waste products leave will be seen later (Alimentary System and Urinary System). We speak of " arterial " blood and " venous " blood respectively. The arterial blood is bright red; the venous is a dull purplish colour. But note that the pulmonary artery is carrying dark, " venous " blood, and the pulmonary veins are carrying bright, oxygenated " arterial " blood.

Though the heart is the main force in driving the circulation day and night throughout life, the return flow to the heart is much assisted by muscular movements exerting pressure on the veins, and by the movements of the chest in respiration. As the veins are supplied at certain points with valves which prevent the blood from flowing backwards, the muscular pressure always acts in the right direction, and greatly helps the work of the heart. Two things are necessary for a healthy and efficient circulation: first, a sound heart and vessels free from obstruction; second, muscular exercise. Further, the circulation cannot be properly carried on unless all other organs, especially the lungs, are in vigorous action.

Position of the More Important Bloodvessels.

A knowledge of the position of the more important bloodvessels is necessary when endeavouring to stop bleeding from wounds and injuries.

Vessels of the Head and Neck.—The **common carotid artery,** the chief artery of the neck, runs obliquely up in a line from the junction of the clavicle and sternum to the angle of the jaw. It lies just inside the anterior margin of the sterno-mastoid muscle, and it divides into the **internal carotid,** which enters the skull to supply the brain, etc., and the **external carotid,** which has facial, occipital, and temporal branches supplying the face and scalp.

Vessels of the Upper Limb.—The **subclavian artery** passes under the clavicle and may be felt behind it; it arches over the top of the first rib into the axilla, where it becomes the **axillary artery,** and continues as the **brachial** down the inner side of the humerus, just behind the inner side of the biceps muscle; and, crossing to the front of the elbow, it divides in the forearm into the **radial** and **ulnar** arteries, which eventually unite again in an arterial arch in the hand, called the **palmar arch.**

Vessels of the Lower Limb.—The **abdominal aorta** divides into the **right** and **left common iliac arteries,** which subdivide into the **internal** and **external iliac** of either side. The latter emerges from the pelvis as the **femoral artery** in the groin, and passes downwards and inwards along the thigh, deep below the muscles, continuing behind the knee as the **popliteal artery,** which, below the knee, divides into the **anterior tibial artery** lying alongside the tibia (shin-bone), and the **posterior tibial,** deep under the calf muscles. These give off branches for the foot and a **plantar arch** in the sole similar to that in the palm of the hand.

The large veins correspond fairly closely to the respective arteries, and generally lie more or less alongside them, but the smaller veins are more irregular in distribution.

The course of the bloodvessels is best learnt by demonstrations on the living body, and their positions cannot be described adequately in a brief summary.

The deep organs in the body are all supplied with special arteries and veins.

Portal Circulation.—There is one vein which deserves special notice—the **portal vein.** This resembles an artery in one respect —that it ends by breaking up into branches. It collects blood containing nourishment from the stomach and intestine; and in the liver it divides into smaller and smaller branches among the liver cells. The liver is therefore supplied with blood from two sources, the **hepatic artery** (a branch of the aorta), and the **portal vein.** It is drained by the **hepatic vein,** which enters the **inferior vena cava.**

THE LYMPHATIC SYSTEM.

There is yet another system of vessels which carry lymph, a fluid which is virtually the same as the plasma or liquid part of the blood. These constitute the **lymphatic system,** which is an adjunct of the circulatory system. We have seen how the nourishment reaches the individual cell units of the tissues by filtering in liquid form through the thin walls of the capillary bloodvessels. This fluid is the **lymph.** It contains the **albumin, sugar, oxygen,** etc., required by the cells for the performance of their functions, and it also carries away the waste products of their activity. It penetrates into the smallest spaces and crevices between the cells, which may be said to be actually bathed in this lymph. Some of it returns to the blood-stream by the way it left, but some of it returns in another way. There are lymphatic vessels, in addition to blood capillaries, coming from the tissues and joining to form larger lymphatic vessels, till the largest of these is reached, in the trunk. It is called the **thoracic duct,** is about the size of a crow quill, and runs up the chest from just below the diaphragm to the base of the neck, where it enters the left subclavian vein, thus pouring the lymph back into the blood-stream just before it enters the right side of the heart. The lymphatic flow is very slow, and on its way it passes through a number of pea-like bodies—the **lymphatic glands**—which occur at intervals. These small glands act as filters, stopping and destroying poisons and microbes which get into the lymph—for example, from a dirty or poisoned wound—preventing these from entering the bloodstream. They also produce **white blood corpuscles,** which have in themselves a certain amount of power to destroy injurious materials. The lymphatic system is thus partly absorbent and partly a means

of defence against disease. The blood supply may be said to resemble the water mains in a building, while the baths, sinks, drains, and traps are represented by the intercellular lymph circulation and the lymphatic vessels.

We shall find, later, when we come to discuss the digestive system, that some of the food we eat is reduced by the digestive apparatus into a white milky fluid, **chyle,** which is absorbed into the blood and serves to replenish it; that some food materials, especially sugars, peptones, and mineral salts, are taken up by the blood capillaries; but that other nutrient matters, especially the fats, are taken up by the special absorbent apparatus (lymphatics) of the alimentary tract, which conveys them into the above-mentioned thoracic duct, to be poured, with the rest of the lymphatic stream, into the blood.

THE RESPIRATORY SYSTEM.

Respiration is the process of breathing, and the organs concerned in it are the lungs and air passages. The air passages are (1) the **nose** and **mouth**; (2) the **pharynx**; (3) the **larynx** (or voice-box), which can be easily seen or felt below the lower jaw; (4) the **trachea** (or windpipe), which passes down the front of the neck into the thorax, where it divides into (5) the **right** and **left bronchi,** which enter the lungs, where they branch again and again into smaller passages called (6) **bronchioles** (or smaller bronchial tubes), and end eventually in (7) the **air vesicles,** which are delicate air-sacs, so small that they can only be seen by means of a microscope.

The **lungs** are two in number, a **right lung** and a **left lung** —one on each side of the chest (with the heart lying between). They are of a spongy consistence (due to the countless air vesicles), and in early life are of a delicate pink colour. As life advances they become darker, particularly in the case of town dwellers, owing to the smoky atmosphere of towns.

When squeezed they give out a fine creaking sound, caused by the driving out of the air from the air vesicles; but when pressure is relaxed they expand again owing to the elasticity of their texture.

Each lung is covered entirely by a fine glossy membrane, the **pleura,** which also lines the chest and the upper surface of the diaphragm. There are thus two layers of pleura, one called the

visceral layer, attached to and covering the lung, the other called the **parietal** layer, attached to the chest wall. The pleura is lubricated by a secretion which allows the two layers to move one against the other without undue friction, and so enables the lung to expand freely against the chest walls. When healthy, the lungs float on being placed in water; this is due to the buoyancy of the air they contain, and has led to the name of " the lights," commonly applied to denote the lungs.

The two lungs are placed on the right and left sides of the chest, the top, or **apex,** of the lung lying underneath the clavicle,

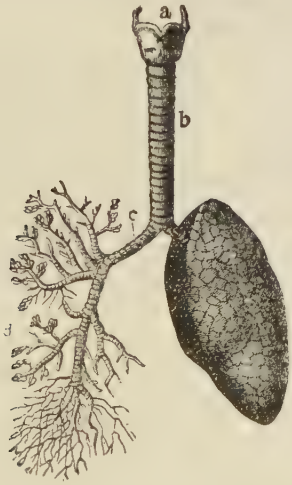


FIG. 17.—LUNGS AND WINDPIPE.

a, Larynx; *b*, Trachea; *c*, Bronchus; *d*, Smallest branches of the bronchus.

and the broad, concave **base** below, resting on the upper surface of the diaphragm (or midriff). The heart lies between them, but as it is more towards the left side of the chest, there is less space on that side, and the left lung is therefore smaller than the right. Each lung is divided into **lobes,** the right lung into three and the left lung into two.

A factor of great importance in respiration is the elasticity of the lungs, which is mainly due to their peculiar structure. This consists in the grouping together in clusters (like grapes) of the extremely minute air vesicles, which have elastic fibres in their lining walls. They remain open or distended, except

during expiration, when pressure partly empties them, but when the pressure is relaxed they open out again. They are connected by the bronchioles and bronchi with the windpipe, and when air is breathed in, it diffuses into all these air vesicles. Over their walls run minute capillaries carrying blood which has been brought to the lung in an impure state; the air in the vesicles and the blood in the capillaries make an exchange; the air gives oxygen to the blood, and the blood gives off carbonic acid gas to the air.

Respiration, which is the function of the lungs, consists of three stages: **inspiration,** when air is drawn in; **expiration,** when air is expelled; and a **pause.**

During inspiration the diaphragm contracts, and its arch is flattened, increasing the capacity of the chest and pushing down the abdominal contents; while the ribs are raised upwards, outwards, and forwards, increasing the capacity of the chest cavity. The lungs, following these movements, expand, and air rushes in. During expiration the process is reversed: the diaphragm ascends, the chest walls are drawn in, the lungs are compressed, and air is squeezed out through the bronchi and windpipe.

The act of **respiration,** therefore, is mainly carried on by the diaphragm and the muscles of the chest walls. But the muscles of the abdominal wall also help in expiration, for if they are forcibly contracted on the contents of the abdomen, the latter push up the diaphragm, and thus help to squeeze the air out of the lungs. Women who lace tightly deprive themselves of this great aid, besides restricting the free movements of the lower ribs.

In health, the adult breathes from fifteen to eighteen times a minute, women slightly more often than men, and children breathe from twenty to twenty-five times per minute. Breathing is more rapid during and after exertion or excitement, in order to make good the greater expenditure of oxygen and get rid of the increased amount of carbonic acid gas which the exertion has produced.

The more fully the lungs expand, the more air they will take in and the more oxygen will the blood receive. The chest and abdomen, therefore, should be free from all tightly constricting garments, and we should all learn to breathe deeply, expanding every part of our lungs from top to bottom. Comparatively few people breathe as deeply as they ought to do, and routine

deep-breathing exercises are of great value in preserving health. Breathing through the nose is more natural and more healthy than breathing through the mouth. This is because the mucous membrane lining the nose warms the in-coming air, and prevents dust and germs from reaching the lungs.

THE AIR.

Fresh air contains **oxygen,** the gas which is necessary for respiration. Expired air—that is, the air driven out from the lungs and already used—besides containing less oxygen than is necessary for life, contains much **carbonic acid gas** or **carbon dioxide.** This gas is colourless, and is the chief product of combustion of all kinds of organic material.

Composition of Fresh Air.—The air we breathe is chiefly a mixture of three gases—viz., oxygen, 21 per cent. (roughly one-fifth), nitrogen, 78 per cent. (roughly four-fifths), with a trace of carbon dioxide (0·04 per cent.), and watery vapour and minute traces of ammonia and other gases.

Expired air contains less than one-sixth of oxygen and far more carbon dioxide (16 per cent. oxygen and 4 per cent. carbon dioxide).

The impurities of the atmosphere are due not only to carbon dioxide, but to dust, micro-organisms of disease, etc. The amount of carbon dioxide is increased wherever there is over-crowding, as in towns or where there is a lack of proper ventilation. Thorough ventilation admits a plentiful supply of fresh air and expels an equal quantity of bad air. It is therefore important to secure free movements of the air—fresh coming in, impure going out—so that the lungs may be kept well supplied, and perform their work satisfactorily. (The subject of ventilation will be discussed under Hygiene, Section IV.)

THE ALIMENTARY SYSTEM.

The alimentary system receives food, digests it, and discharges the refuse of the food from the bowels. Its apparatus begins with the **mouth** and ends with the lower end of the bowel—the **anus.** It consists principally of a tube, the **alimentary canal,** which is capable of being closed at certain points by muscular rings, or valves, called **sphincters.** From the mouth to the anus the length of the alimentary canal is about 30 feet.

We may conveniently regard this long tube as being composed of three lengths:

First, from the mouth, the **pharynx** (the back of the throat) to the **œsophagus** (gullet), which is narrower, and passes down behind the **trachea**, through the diaphragm into the stomach.

Second, the **stomach,** which is an expanded portion of the tube—a large bag intended as a temporary receptacle for the food, which lies below the diaphragm, in the upper part of the abdomen towards the left-hand side.

Third, the **intestines**—namely, the **small intestine,** about 20 feet long, which twists to and fro across the abdomen till it ends in the **large intestine.** The latter is about 6 feet long, passes up the right side of the abdomen, then across the top and down the left side, and turns backwards to form the **rectum,** which ends at the **anus.** The intestines are attached to the posterior wall of the abdomen by folds of **peritoneum,** called the **mesentery.**

Associated with the alimentary canal are two other important organs, the liver and the pancreas. The **liver** is a large organ lying in the upper right-hand region of the abdomen. It is the largest gland in the body, and weighs about 50 ounces.

Attached to its under surface is a small sac, or bag, the **gall-bladder.** The liver produces a greenish, bitter fluid called **bile,** which is stored up in the gall-bladder and is poured out as required, through a tube (the **bile duct**), into the upper part of the small intestine (the **duodenum**) during the process of digestion.

The **pancreas** also communicates with the duodenum by means of a similar tube, the **pancreatic duct,** which pours the pancreatic juice into the duodenum.

There are other glands concerned in the process of digestion. These are the **salivary glands,** which deliver **saliva** into the mouth. This group consists of: (1) the **parotid glands,** lying in front of the ears, one on each side of the face (it is swelling of the parotid glands which causes the curious appearance of the face in mumps). A small tube on the inner side of the cheek pours the parotid saliva into the mouth. (2) The **sublingual glands,** lying in the floor of the mouth, under the front of the tongue; their tiny ducts can be seen when the tongue is raised. (3) The **submaxillary glands,** lying one on each side under cover of the sides of the lower jaw, their ducts also opening into the floor of the mouth.

The walls of the **stomach** are composed of three layers of

involuntary muscle fibres, and are lined by a smooth membrane **(mucous membrane),** which contains countless microscopic glands. Each of these glands is like a tiny short tube, with an opening into the stomach cavity. The walls of the **intestines** resemble those of the stomach in structure, though there are differences in the nature of the glands.

All glands are well supplied with blood, and from certain materials selected from it they manufacture fluids having special properties of their own. Thus we have **gastric glands, salivary glands,** etc., preparing fluids peculiar to themselves, the **gastric juice, saliva,** etc., each having a precise chemical character and a special precise function to perform. They are said to **secrete** these juices, and the product is called a **secretion.**

The facts about digestion are best understood by first considering the varieties of food and then how each is dealt with in the body. Two main purposes are served by alimentation (taking food). The first is the supply of fuel for the production of bodily energy and heat. The second is the building up and repair of organs and tissues, in which wear and tear are always going on.

Foods may conveniently be classed thus:

1. **Proteins (Nitrogenous).**—These are the most important substances in living tissues, in both animal and vegetable protoplasm. Among other things they contain a rich supply of nitrogenous material, and provide the organic nitrogen required in the body. Examples: white of egg, lean meat, casein of cheese and milk, gluten of flour and oatmeal, legumin of peas and beans.

2. **Fats.**—Examples: oil, cream, butter, fat, lard.

3. **Carbohydrates (Starches and Sugars).**—Examples: potatoes, flour, rice, cane sugar, grape sugar, beetroot, honey.

4. **Minerals.**—Some mineral or inorganic substances are necessary for various purposes. For instance, lime salts give hardness to our bones, the blood cells need potash and iron salts, while other salts are needed to keep the bodily functions in order in many different ways. Examples: soda, common salt, lime, potash, magnesia.

5. **Water.**—Water is required to supply the necessary amount of fluid for the tissues and to keep in solution the various food materials and waste products.

DIGESTION AND ASSIMILATION.

Enzymes, or Ferments.—The processes whereby foodstuffs are broken up and converted into products suitable for the use of the tissues are carried out principally by various agents which cause fermentation to occur. The best-known examples of fermentation on a large scale are the conversion of grape-juice into wine, and of malt into beer by the action of yeast ferments. Another common example is the curdling of milk by the addition of rennet.

In the body we have special digestive ferments or enzymes, such as **ptyalin,** which is secreted by the salivary glands, **pepsin,** secreted by the glandular cells in the stomach walls, **trypsin,** secreted by the pancreas, and others, some of which will be referred to later.

The process of digestion begins when we take food into the mouth. It is complicated, consisting of several stages, and is partly mechanical, partly chemical; the aim being to reduce into a state of solution all the different articles eaten, so that they may pass into the blood and be circulated throughout the body, as well as to convert them into the special compounds required by the tissues.

In the mouth the food is ground by the teeth in the action of chewing (**mastication**) and moistened by the saliva, making it into a soft, pulpy mass or "bolus." The saliva has a chemical action on starchy food, the salivary enzyme known as ptyalin converting the starch, which is insoluble, into sugar, which is readily dissolved.

When the bolus is ready it is swallowed. The act of swallowing is carried out by muscular action. The tongue, the bulk of which is voluntary muscle tissue, rises against the roof of the mouth and presses the bolus backwards into the throat, where it comes under the action of the muscles of the soft palate. These send it further back into the pharynx. The walls of the pharynx and œsophagus contain involuntary muscle which acts automatically. The walls of the pharynx close together against the bolus, driving it onwards into the œsophagus, where, by a similar mechanism, it is driven down into the stomach.

The **stomach,** as already mentioned, is a bag for the reception of food. At each end, where it is narrowed, there are special rings of involuntary muscle—the **sphincters**—capable of contracting to close it and of dilating to let food through. The

lower end, which leads into the small intestine, is called the **pylorus.** The innermost layer, the lining of the stomach, contains minute glands which secrete a fluid known as the **gastric juice.** This juice contains some **hydrochloric acid,** certain **chlorides,** and enzymes, the chief of which are **pepsin** and **rennin.** This gastric juice oozes out and mixes with the food when it enters the

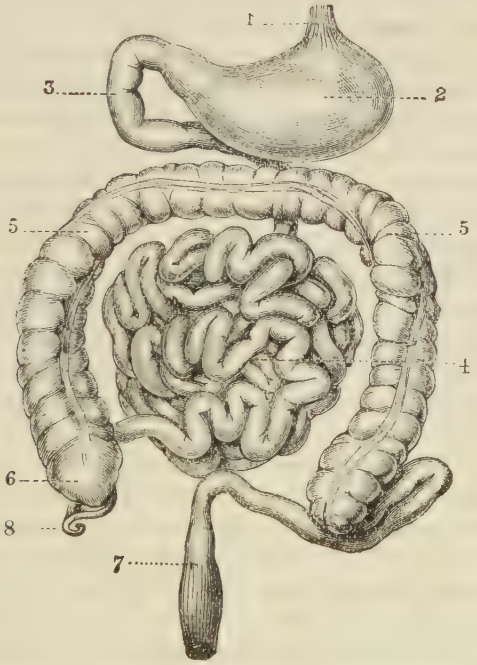


FIG. 18.

1, Lower end of gullet; 2, stomach; 3, duodenum; 4, small intestine; 5, large intestine; 6, cæcum; 7, rectum ending in anus; 8, vermiform appendix.

This drawing is diagrammatic, and does not represent the anatomical positions of the organs.

stomach. It has a chemical action upon the nitrogenous food, digesting such things as white of egg, lean meat, and other albuminous foods, converting the protein into proteoses and peptones. Rennin curdles milk. When food enters the stomach, it takes about half an hour for gastric juice to be secreted in sufficient quantity to deal with it, and during this time the saliva which has been swallowed still continues its action on the starches

in the stomach. When enough gastric juice has been secreted and the stomach contents are strongly acid, the saliva ceases to act and gastric digestion proceeds. The muscular fibres in the walls of the stomach contract and expand rhythmically, producing wave-like movements, churning the food and juices thoroughly together, and pushing it on through the pylorus into the intestine, until the stomach is gradually emptied.

The small intestine is a long convoluted tube about $1\frac{1}{4}$ inches in diameter, with involuntary muscle fibres in its walls and a lining membrane rich in minute glands which secrete intestinal juice. The upper end is called the **duodenum.** This is about 10 inches long; starting at the pylorus it curves downwards in horse-shoe fashion. It is into the duodenum that the pancreatic and bile ducts open. The middle portion of the small intestine, called the **jejunum,** is about 9 feet long, and the lower part, called the **ileum,** is about 12 feet in length. In the jejunum, and to a lesser extent in the ileum, the inner surface of the intestine is raised up into countless small thread-like eminences, not unlike the " pile " on velvet. These are called **villi,** and will be referred to again when speaking of absorption.

On leaving the stomach and entering the duodenum, the food is subjected to a further chemical change. The enzymes of the intestinal juice act on all kinds of food. In the duodenum, bile from the liver and the pancreatic juice are first brought into contact with the food. While the bile appears to act only on fats, preparing them for absorption, the pancreatic juice acts more strongly than the intestinal juice on all classes of food. It contains four distinct enzymes—**trypsin,** acting on proteins, **amylase,** on starches and sugars, **lipase,** on fats, and one which curdles milk.

The gastric enzyme, pepsin, only acts in the presence of an acid, whereas the intestinal and pancreatic enzymes act in an alkaline medium.

The passage of the food from the stomach to the intestine is regulated by contractions and relaxations of the pyloric sphincter. These depend on the consistency of the food and on the degree of acidity in the duodenum. The approach of a hard, solid piece of food to the pylorus causes it to contract so that only the fluid and soft, semi-fluid, partly digested food can pass out of the stomach.

Further, when this acid mixture (the acid chyme) comes into contact with the duodenum it sets up a contraction of the pylorus

which stops the flow of food from the stomach, and which only relaxes again when the contents of the duodenum have been neutralised to a certain extent by the bile and pancreatic juice.

The acid chyme acts in another interesting way here. Under its influence the cells of the mucous membrane of the duodenum produce a substance called **secretin,** which is carried by the blood to the pancreas and liver, and causes the cells in these organs to secrete their juices to carry on digestion.

Secretin belongs to a group of chemical substances called **hormones.** Hormone is a word meaning " to rouse or set in motion."

These substances are formed in one organ or part of the body, and are carried in the blood-stream to another organ or part, which they stimulate to functional activity or secretion. The secretions of the endocrine glands are regarded as hormones; so is the carbonic acid produced in muscle during contraction, which stimulates the respiratory centre to increased activity.

The proteins, already partly converted into peptones in the stomach, are now split up into more absorbable forms—the **amino-acids.**

Up to this point the fats have undergone little change. It should be remembered that, as fat is softened by heat into an oily state, the body heat melts the fats in our food into oil. The bile and the pancreatic and intestinal juices form an emulsion with the oil, which thus becomes broken up into minute particles, or droplets. These are converted into a soapy material which can be absorbed into the lymphatic vessels. Certain bacteria present in the small intestine also aid in the disintegration and digestion of food. These digestive processes continue all the way down the small intestine. The food is driven onwards by the muscular tissue, which contracts and presses it along in much the same way as described in the pharynx and œsophagus. This takes place in rhythmical waves, and is called **peristalsis.** The movements of the intestine look very like the undulating movements of the body of a worm as it stretches and contracts in its progress. When these are interfered with and become violently spasmodic, or when, owing to obstruction, they take place in a reverse direction, they produce griping, and " colic."

The food, now digested and greatly changed in character, reaches the body tissues by a process of absorption. The walls

of the intestines are richly supplied with capillary bloodvessels and with a special system of lymphatic vessels. Each of the myriads of villi lining the small intestine contains a minute lymphatic vessel, capillaries, and minute veins. Most of the digested food is absorbed through the lining membrane of the intestine into these capillaries and small veins. By them it is carried into the portal vein, which leads to the liver. The liver, in addition to producing bile, is a large storehouse of sugar material in a form termed **glycogen.** It doles this out as required into the general blood-stream. Thus the blood is not overloaded by a great quantity of sugar at any one time, and yet its requirements are being constantly supplied. A different group of enzymes present in the tissues acts upon the digested protein products, reconstructing them into the forms of protein required for the body.

Fat is one article of food which cannot pass unchanged through the capillary walls. After being partly converted into soap, however, it can pass into the above-mentioned intestinal lymphatic vessels. The emulsified and saponified fat, absorbed into the lymphatics, gives them a milky appearance, on account of which they are called **lacteals.** This fat, or **chyle,** is carried by the lacteals up into the main lymphatic vessel, the **thoracic duct.** This duct, as its name implies, lies mainly in the thorax, but it begins just below the diaphragm in the abdomen, at which point it is a little dilated and is called the " receptaculum chyli " (or receptacle for the chyle). It passes up in front of the spinal column into the thorax to the base of the neck, where, as we have already seen (p. 63), it joins the large veins leading into the right side of the heart. At this point the altered fat gets into the circulating blood-stream.

The **small intestine** (ileum) at its lower end opens into the large intestine in the right iliac fossa, the lower right region of the abdomen. The **large intestine,** as already stated, passes up the right side of the abdomen to the under surface of the liver and crosses below the stomach, then passes down the left side, then finally backwards in the pelvis to end at the **anus.** The first part, where the ileum enters, is somewhat sac-shaped, and is called the **cæcum,** and the last part, just above the anus, is called the **rectum.** The intermediate portion receives the name of the **colon.** The **vermiform appendix** is a small, worm-like organ attached to the cæcum. Its use in man is obscure, and

it can be dispensed with, for in many cases, when inflamed (appendicitis), it is removed by operation, and the health of the individual is apparently in no way impaired. The process of digestion has ceased by the time the food is passed into the large bowel, but a certain amount of absorption, especially of water, continues, and the fæces thus become semi-solid.

As the result of the above process of digestion and absorption, the blood receives and is enriched by proteins, sugars, fats, and minerals. The tissues take from the blood whatever they require, whether for their own building-up or for the production of force (as in muscular exertion). This final stage of the whole process whereby the body is nourished is called **assimilation.**

The bowel has another function, that of removing certain waste products. The capillaries which absorb digested material from the lining of the bowel also bring the waste material which is discharged into the bowel. Again, not all the material we eat is used for nourishment. Much of it is indigestible. As food passes down through the bowel, what is of use is digested and taken up, leaving what is useless to be carried on and discharged with the waste products in the form of excreta.

The principal facts above stated concerning digestion and absorption are set out in the following table:

Alimentary Canal.	*Secreting Glands.*	*Secretions of Glands.*	*Class of Food Acted Upon.*	*Conversion.*	*Absorption.*
Mouth	Salivary glands (parotid, etc.)	Saliva	Starches, Cane sugar	Grape sugar	Into capillaries of intestines.
Stomach	Gastric glands	Gastric juice	Nitrogenous (protein)	Peptones	Into capillaries of stomach and intestines.
Duodenum	Liver Pancreas	Bile Pancreatic juice	Fats Fats, Starches, Protein	Emulsified Saponified sugar, Peptones	Into lacteals. Into capillaries of intestines.
Small intestine	Intestinal glands	Intestinal juice (*succus entericus*)	Action similar to pancreatic juice, but weaker. Emulsification and saponification of fats continue. Peptones converted into amino-acids.		
Large intestine	The process of digestion ceases with the small intestine, but the process of absorption, especially of water, continues in the large intestine.				

A good diet should consist of such a judicious blending of proteins, carbohydrates, fats, and minerals that the greatest amount of nourishment and the largest amount of body heat and energy will be obtained from a reasonable bulk of food. This will be referred to again under Hygiene (pp. 150-156).

SECRETION AND EXCRETION.

A **secretion** is something produced by a gland for the purpose of performing a necessary function. The gland takes what materials it requires from the blood, and out of these it prepares its own special secretion. This is best explained by examples. The cells lining the stomach wall prepare gastric juice for the purpose of digesting proteins; the liver prepares bile which is intended to act upon fats. The gastric juice and the bile are called the "secretions" of the gastric glands and of the liver respectively.

An **excretion,** on the other hand, is something which has been separated out for the sole purpose of getting rid of it, because its retention by the tissues would be either unnecessary or harmful. For instance, carbonic acid gas is a waste material expelled by the action of the lungs, and urine is a fluid containing waste matter separated out by the action of the kidneys.

By this time the reader will have grasped the fact that the body develops heat and energy from the fuel—food—supplied to it. Clearly, the continual using-up of fuel and the wear and tear of body tissues involve a certain amount of waste material.

The coal that an engine burns leaves a quantity of ash and slag, which must be removed or the furnace would become choked and useless, while other waste products go up the engine's chimney as smoke. A similar process takes place in the human body, which has to get rid of considerable waste material, and is provided with special apparatus for this purpose. The function of removing waste products is called excretion, and the organs which take part in it are the bowels, the kidneys, the skin, and the lungs.

We have already seen that the lungs in the act of expiration throw off, or excrete, carbonic acid gas, water vapour, and minute traces of ammonia; that the skin, by means of the sweat glands, throws off impurities dissolved in the sweat; and that

the bowels get rid of the refuse of the digestive process along with the other matter thrown into the intestine. Three of the above organs have other functions besides that of excretion, but the kidneys are solely excretory.

THE URINARY SYSTEM.

The kidneys, ureters, bladder, and urethra are the organs comprised in the urinary system. There are two **kidneys,** situated one on each side at the back of the abdomen in the region of the loins. In shape each kidney is like a very large bean, about 4 inches long, and weighing from 4 to 5 ounces. The function of the kidney is to remove from the blood certain impurities and waste substances. The kidneys contain a large number of minute tubes which lie amongst a mass of capillary bloodvessels. Soluble impurities are extracted from the blood and drained away by these tubes in the form of urine. Two ducts called **ureters,** one from each kidney, run down to the **bladder,** which is merely an elastic pouch or receptacle for collecting urine; the **urethra** is a single duct through which urine is emptied from the bladder.

The Urine.—In healthy conditions this is a clear straw-coloured fluid, faintly acid and slightly denser than water, having a specific gravity of about 1020, that of water being 1000. The amount normally passed by a healthy person is about 50 ounces daily, 'though this may vary according to circumstances. The amount of urine excreted is greater after increased exertion, or increased consumption of food or drink, and after exposure to cold. Similarly, it may be diminished when insufficient food or drink is taken, and after exposure to heat, particularly if there has been much sweating. The principal waste products dissolved in the urine are **urea** and **uric acid,** which are nitrogenous compounds, also various salts.

Excretion is a very important function, and is as essential to a healthy state of body as free drainage is to the sanitary condition of a dwelling-house. Interference with it always causes some degree of bodily disturbance.

THE REPRODUCTIVE ORGANS.

The principal generative organs in the female are the ovaries, the Fallopian tubes, the uterus, and the vagina.

The **ovaries** are two small oval bodies, about the size and shape of a broad bean, and lie one on each side of the uterus. In them are produced the **ova,** the cells which, when fertilised, develop into the new being.

The **Fallopian tubes** are two ducts, one on each side, along which the ova pass into the uterus.

The **uterus,** or womb, is a hollow muscular organ composed largely of unstriped (involuntary) muscle fibres, with a lining of mucous membrane. It is somewhat pear-shaped, about 3 inches long, and lies in the pelvis, in front of the rectum and behind the bladder. In it the fertilised ovum is received and develops until ready for birth. The lower, narrow end of the uterus is called the **cervix,** and projects slightly into the **vagina,** which is a passage in the floor of the pelvis leading to the surface of the body, where it opens just behind the orifice of the urethra.

The principal male organs of generation are two **testicles** contained in a sac called the **scrotum.** In them are developed the **spermatozoa,** the cells which fertilise the ova. On each side a canal, called the **vas deferens,** leads from the testicle into the urethra. It passes inwards along the inguinal canal, and joins with its fellow of the opposite side just before entering the urethra. The **prostate gland** is about the size of a chestnut, and surrounds the beginning of the urethra where it emerges from the bladder. Its functions are still obscure. It is frequently enlarged in old men, and may then give rise to difficulty in passing urine. The **urethra** passes down the **penis** to the exterior.

REPRODUCTION.

All plants and all animals are provided with means whereby to multiply and produce new members of the species for the preservation of the race to which they belong. In the simplest and lowest forms, one-celled creatures, such as the amœbæ, the process is very simple. The parent cell splits into two parts, each of which has all the characteristics of the original cell.

Slightly higher up the scale we come to a group of creatures which develop bud-like shoots, which are cast off, and grow into fully developed individuals like the parent organism from which they sprang. Still higher in the scale we find creatures in which there are two different sexes, male and female, each having a special set of reproductive cells. The male cells are called **spermatozoa,** or sperm cells, and the female cells **ova,** or egg cells. A somewhat similar state of affairs is found in the vegetable kingdom, where some plants subdivide, some throw out shoots, and some have male and female flowers, the " pollen " being conveyed from one flower to another by insects which visit them for the honey.

In the higher animals neither the spermatozoa alone nor the ova alone are capable of producing new individuals; but when a spermatozoon unites with an ovum, which it does by penetrating into it and fusing with it, the ovum becomes fertilised, and begins to subdivide into a number of new cells. This process of subdivision goes on until by degrees a new individual emerges. In the course of development the subdividing cells become more and more differentiated, and gradually build up the various structures and organs which exist in the fully developed animal, with the same form, the same functions and capabilities, as are possessed by the parent animal. The essential features of this process are the same in those creatures which lay eggs, such as fishes, reptiles, and birds, as in the higher animals, called mammals, in which the development of the immature creature or **embryo** takes place inside the maternal uterus. In the one case, however, the growing embryo derives the necessary nourishment from the albumen surrounding it in the egg till it is ready to be hatched out, and in the other case the embryo derives its nourishment from the maternal blood which comes to it through the **placenta.** This is a very vascular structure, developed from the mucous membrane lining the uterus. In some creatures, as in the human being, it is expelled later from the uterus as what is commonly called the " after-birth "; and in others it is reabsorbed into the uterine wall. As the embryo grows in size within the uterus, the uterine walls are increased and extend to keep pace with it; but after it is expelled the walls contract until the organ resumes its original size. The human embryo, during intra-uterine life, is called the **fœtus.** Each species of animal has its own appointed time for this

developmental process. The hen's eggs require to be incubated for 21 days, the duck's for 28, before they hatch out; the embryonic dog takes about 63 days, and the human fœtus about 290 days before it is ready to be expelled and begin a separate existence. We thus see that the very highest and most complex creatures, including man, consist in the first instance of a single cell.

THE ENDOCRINE GLANDS.

All the glands which have been described in the previous pages of this book, except the lymphatic glands, are supplied with special tubes or ducts to carry off their products as secretions or excretions. There are certain glands not so provided, and it has been common on this account to call them the **ductless glands.** For various reasons this is an unsatisfactory term, and they are now better known as the **endocrine glands.** This name signifies glands producing secretions which pass directly into the blood-stream, as opposed to those whose secretions are poured out to act elsewhere. Their exact action is still imperfectly understood, but we know the principal effects. While the following organs are now generally grouped under the heading of endocrine glands, it has been found that many other organs, such as the liver, produce endocrine secretions, or **hormones,** in addition to their other special functions.

1. **The Spleen.**—This is a soft organ about the size of a kidney, and is situated in the abdomen above the left kidney and close under the lower ribs. One of its functions is to produce a certain type of white blood corpuscle (**lymphocyte**). It also acts as a filter for the blood which passes through it, removing and destroying the damaged and worn-out red corpuscles, as well as some disease germs (bacteria). It has some influence on immunity or resistance to disease.

2. **The Pancreas.**—This is an example of an endocrine gland which is not ductless. As mentioned on p. 68 the pancreatic juice passes through the pancreatic duct into the duodenum, and is one of the principal digestive fluids. It is secreted by the ordinary gland cells of the pancreas. But besides these, quite another kind of gland cell occurs in small groups throughout the organ; these groups go by the name of the "Islets of Langerhans," and secrete a hormone named **insulin** (*insula* = island), which is absorbed into the blood and throughout the body—blood,

muscles, liver, etc.—promotes the change of grape sugar into carbon dioxide in producing energy. If the islets are diseased sugar accumulates in the blood and passes out in the urine, the condition being known as **glycosuria** (p. 259), the disease produced being **diabetes.**

3. **The Thyroid Gland.**—This consists of two small lobes situated in the neck on either side of the larynx, and joined together by a narrow piece, the **isthmus.** It produces **thyro-iodin,** which has influences on growth and the maintenance of nutrition, also on the temperature, pulse, and blood pressure, which last it can lower by causing dilatation of the bloodvessels. In a condition known as **goitre** this gland is much enlarged, and shows as a large, rounded swelling on the front of the throat; but although enlarged it is degenerated and the secretion is deficient. In Derbyshire and in some valleys in the Swiss Alps, people with such enlarged thyroid glands are frequently seen. Absence or loss of function of the thyroid gland, beginning in childhood, results in a disease called **cretinism,** which persists through life, and is a common cause of lack of physical and mental development. It is characterised by very stunted growth and a prematurely aged appearance. In adult life, diminished thyroid secretion causes **myxœdema,** and over-secretion causes **exophthalmic goitre** (see p. 277).

4. The **Parathyroid Glands** are four small glands, two on each side, lying close to the lobes of the thyroid, somewhat resembling it; they regulate the supply of calcium salts in the blood.

5. **The Suprarenal Capsules (or Adrenals).**—These are two glands about the size of a large bean, one above each kidney (hence the name). Each consists of an outer layer, or **cortex,** and an inner layer, or **medulla,** which are different in structure and in function. The medulla produces **adrenalin,** a hormone, which affects the blood pressure (raising it by causing constriction of the vessels), keeps up muscle tone, and has an effect upon pigmentation. In one form of adrenal disease (Addison's disease) the skin may become very dark and swarthy all over. The cortex produces a secretion which appears to influence growth and sexual development.

6. **The Pituitary Gland.**—This is a small, round, pea-like body in the floor of the skull, with two distinct parts, an anterior and a posterior. The former probably has functions similar to the adrenal cortex, while the latter has a marked effect on the

growth of bones. "Acromegaly," a rare disease, which is characterised by an enlargement of the bones of the hands, feet, and face, resulting in considerable deformity, is due to an increased secretion of this gland, which is also the principal cause of the exceptional stature of giants.

7. **The Thymus Gland.**—This is present in infancy and gradually diminishes during the years of childhood, till in adults it has generally disappeared. It lies behind the top of the sternum. Its function is still little understood, but it seems to play an important part in the regulation of lime salts in the body.

8. The **Pineal Gland,** which is attached to the brain, is now considered by many investigators to have a place in the list of endocrine glands.

9. The **testes** and **ovaries,** besides their special reproductive functions, produce endocrine secretions which have an important effect on the development of what are called the **secondary sexual characteristics,** such as the growth of hair on the face and the deepening of the voice in man, the differentiation of the plumage in male and female birds, and the development of antlers in the stag. The **prostate** also secretes a hormone which probably stimulates sexual desire.

Many of the above endocrine glands greatly influence the mental and nervous mechanism. When they are diseased, it is possible in some cases to supplement the deficiency of their secretions by administering specially prepared tissue or extracts from the corresponding glands of sheep and other animals.

SECTION III

FIRST AID

In mental hospitals, where there is always a medical officer at hand, it is the universal rule to report to him at once the occurrence of any accident or unusual incident. It is well, therefore, to cultivate the habit of describing the event in a very few words, indicating the apparent degree of seriousness and the patient's name, in order that the doctor may have some idea before reaching the ward of what is required—whether instruments from the surgery, restoratives, splints, etc.

The nurse must be prepared, however, to render **First Aid** in case of accident or emergency.

Improvised Methods of Lifting and Carrying the Injured.—Before attempting to move an injured patient, any first aid that may be required should be rendered, and the clothing around the neck and chest should be loosened. The actual removal may be done by means of an improvised stretcher, or one of the several methods of carrying presently to be described. In the improvisation of a stretcher, such articles as doors, shutters, and gates may be utilised. A couple of stout poles can be passed through several slits made on each side of a blanket, sacking, or canvas. Failing these, the sleeves of two coats may be inverted and the poles passed through them. The coats can then be buttoned, and a waistcoat may help to give additional support. Whatever its construction, the completed stretcher must first be tested by a person of a weight at least equal to that of the patient about to be carried.

During movement, the bearers must walk with short paces and without keeping step. This will avoid swinging the stretcher, which must be kept level. Watch the patient during transit As a general rule the patient is carried feet first, but when going up steps carry his head foremost, and see that the bearers

at the foot-end elevate their portion of the stretcher so that it remains horizontal.

If a patient has to be moved single-handed, it may be done "pick-a-back," provided he is able to give some help. Should he be unconscious, the method known as "the fireman's lift" will be found useful. This may be carried out as follows:

Roll the patient on his face, keeping his arms to the sides, stand at the head and, seizing him under the armpits, raise him to the kneeling position facing you. Next raise him to the upright position, and stoop, with your head under his right arm, holding the latter around your neck with your left hand. With your right hand around his right thigh, bring the weight of his body over your right shoulder and stand up.

If two bearers be available and the patient be unconscious, one bearer should pass his arms under the patient's armpits from behind, clasping them in front of the chest, while the other bearer carries the patient's legs forward, one on each side.

Should the patient be conscious and two bearers be present, the two, three, or four-handed seat can be used.

Removal of the Patient's Clothes.—This should be done before the patient is put to bed, unless he is suffering from severe shock. It may be necessary to cut portions of the cloth. Should this be required, do so along the seams. In the case of taking off a coat from an injured arm, first remove the uninjured arm from its sleeve. The reverse of this procedure applies in putting on a coat, the injured arm being taken first. Clothes should not be pulled off if they are adherent to the flesh. Anything possible may be cut and the adherent portions left undisturbed. This remark applies especially to burns, in which case adherent portions of cloth may be soaked with oil.

Preparation for the Reception of Accident Cases.—Should the accident occur at some distance from a hospital ward, it may be necessary to select a suitable room and have it prepared for the patient.

Before the reception of a case, clear the room as thoroughly as possible, and remove all superfluous hangings and furniture.

The nurse must use her intelligence regarding the possible requirements of the surgeon, and anticipate his requests by having the articles near at hand. Such things as splints, basins, boiling water, dressings, and antiseptics will probably be needed. It is a safe rule to have a steriliser ready in case instruments

should be used. Hot-water bottles, warm blankets, and perhaps stimulants, may be required. All objects of a potentially dangerous nature must be kept at a safe distance from the patient.

Preparing the Bed.—Choose a single bed (or as narrow a bed as possible) that is easily moved and approachable from either side. Nowadays mattresses are usually made of horse-hair; these are preferable to any of the softer varieties. A proper hospital fracture bed as a rule has its mattress made in sections, and is constructed so as to avoid any sagging in the middle. To prevent this sagging on an ordinary bed, firm boards can be placed over the wire and under the mattress at any point, or even across the whole length of the bed. The ends of these boards will rest upon the side-bars of the bed, and should be of sufficient length to overlap the bar without unduly protruding beyond. In certain fractures of the lower limbs it may be advisable for the patient to be extended as flatly as possible, and for the pillows to be removed; or, at most, to use a very thin one. A long waterproof covering the mattress will protect it from being soiled; this waterproof is covered by the under-sheet, and a " drawsheet " over that will often be found very useful. This is made by folding an ordinary sheet four times lengthwise into a width which will roughly extend from the shoulders to the knees of the patient. This is placed across the bed, and the ends are tucked away under the mattress. A fresh portion of sheet can then be drawn under the patient when necessary, with a minimum amount of disturbance. A small waterproof sheet should be placed underneath this drawsheet, and the ends of both should be firmly tucked underneath the mattress. The surface of the drawsheet should be smooth, free from patches and creases. Beneath the patient, then, in the centre of the bed, from below upwards, will be found mattress, long waterproof, under-sheet, short waterproof, and a drawsheet. When a drawsheet and waterproof are not used, an under-blanket should be spread between the mattress and the under-sheet. It will be seen that by using a drawsheet and small waterproof, the sheet immediately underneath the patient can be renewed—should the necessity arise—without disturbing the under-sheet or remaking the whole bed. Bedclothes should be warm but light, and before the reception of the patient they should be folded down one side of the bed. Hot-water bottles

may be utilised to warm the bed, and these should be securely and completely wrapped in some woollen material so that they cannot come in direct contact with the skin of the patient. Very severe, and often fatal, burns have been caused in unconscious or partly unconscious patients by neglect of this precaution. The nurse should always satisfy herself that this danger is avoided, but, should a burn occur, the matter should be immediately reported, so that steps may be taken to minimise the damage. The proper method of making a bed which is occupied by a patient will be fully dealt with in the section on Sick Nursing.

Asepsis and Antisepsis.—Sepsis is a condition due to the invasion of minute bodies called microbes or micro-organisms, which are so small that they can only be seen with the aid of powerful microscopes. There are many varieties of microbes, grouped under such names as bacteria, bacilli, cocci, and spirilla.

They are the causes of many forms of illness, especially those of the fever type. Some bacteria are capable of producing pus or matter if brought into contact with a wound, which is then called purulent or suppurating. A wound is said to be aseptic when no microbes are present, and it is the aim of all modern treatment to exclude microbes and so establish a condition of asepsis, which is the exact opposite of sepsis. This enables the wound to heal rapidly.

It must be thoroughly understood that these micro-organisms exist in everything about us—even the air contains them. The only things that are free from them are objects that have been subjected to great heat, such as boiling water, or that have been immersed for considerable periods in certain substances which prevent the growth of micro-organisms and even kill them. These substances are called "antiseptics." The process of making anything aseptic is called **sterilisation.** Even sterilised articles become infected immediately, if brought into contact with something that has not been sterilised. It behoves us therefore to sterilise everything we may bring into contact with a fresh wound, and above all to remember that the skin of our hands may be a great source of infection, as it is not really possible to sterilise it; and all handling of a wound must be avoided as far as possible. Failure to appreciate this truth may mean the loss of a patient's life from septic infection.

The greatest and safest of all disinfectants is a high degree of moist heat. Certain microbes will resist the action of very dry heat for a long time, but the boiling of dressings and instruments for at least ten minutes will kill most organisms contained in them and so render them aseptic. Unfortunately, many things, such as the skin of one's hands, cannot be boiled, and antiseptics have to be used in trying to render them sterile.

As even prolonged treatment of the naked hands ends in failure to make them quite above suspicion, rubber gloves, which can be boiled, are now almost universally employed in surgery.

There are a great number of antiseptics, and they possess various qualities which make them either suitable or unsuitable for certain uses. It will be obvious that those which are very poisonous cannot be recommended for treating the internal cavities of the body.

During recent years many antiseptics have been placed upon the market, which claim to be of a more or less non-poisonous nature and yet very powerful in their action upon microbes. It is not possible to dwell, in this section, upon the characteristics of the many antiseptics. A full account of these will be found in the section on Sick Nursing.

At the same time, any person who undertakes first-aid work must necessarily know the form and strength in which some of them may be used.

Alcohol, in the form of methylated spirit, will probably be found to be the antiseptic most easily obtained. It is somewhat irritating to the tissues.

The following are in common use:

Carbolic Acid.—Strength of use, 1 in 60 to 1 in 40; 1 in 20 for instruments.

Perchloride of Mercury.—1 in 2,000 to 1 in 1,000. This destroys metal instruments.

These two are very poisonous if swallowed. It is not advisable for a nurse to use them in any enclosed cavity unless specially directed to do so by a doctor.

Iodine may be used in the form of ordinary tincture (about a 2 per cent. strength), for disinfecting the skin, which should be dry. For disinfecting wounds it may be used in the same strength, or as a solution of one teaspoonful to the pint of water for continued treatment.

Boric Acid may be used either as a powder or a solution. The latter may be made by adding one or two tablespoonfuls of boric acid crystals to a pint of hot water.

Eusol is a mixture of chlorinated lime and boric acid. It can be used in one-quarter to one-half, or even full strength.

Liquor Cresolis Saponatus is derived from crude carbolic acid. It resembles Lysol, the patent for which has now expired. It may be used in ½ to 1 per cent. strength for mucous membranes and wounds; 1 to 2 per cent. strength for external application; 2 to 3 per cent. strength for disinfecting instruments.

Three-quarters of a teaspoonful to one pint of water represents roughly ½ per cent. solution of any antiseptic.

BANDAGING.

The **triangular bandage** is especially suitable for emergency work. It may be made from a handkerchief or other piece of material about 36 inches square. By cutting it diagonally into

THE TRIANGULAR BANDAGE.*

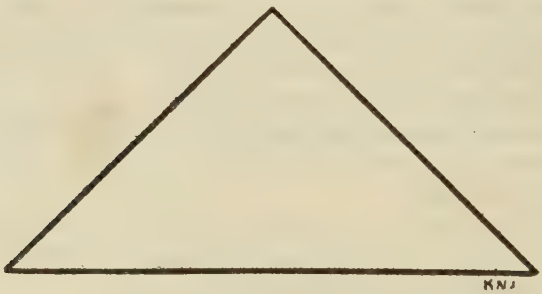


FIG. 19.—Bandage spread out.

two pieces, each piece will become a triangular bandage. The main parts of the bandage are the apex or point, the base, the ends, the sides, and the two surfaces. It can be made broad, narrow, or medium in size by a process of folding.

* All illustrations in this section are taken from Fitzwilliams' "Practical Manual of Bandaging" (Baillière, Tindall and Cox).

Mr. Fitzwilliams says in his Preface, "This book was written in spare time snatched while the author was acting as Medical Officer to 1,500 prisoners of war (Germans, Austrians, and Turks), Surgeon to the Island of Malta. . . .

"For the illustrations I am indebted to M. Joseph Nagy de Kemer, a Hungarian prisoner of war, a fact which may have tended to influence his pencil."

Before applying the bandage, cover the wound with a clean dressing—preferably antiseptic. Tie all knots in the form of a reef knot. The bandage may be made to fit by turning

THE TRIANGULAR BANDAGE.

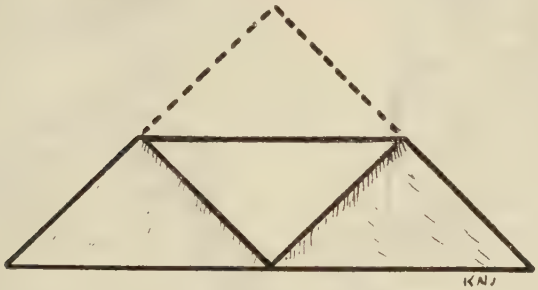


FIG. 20.—Bandage once folded.

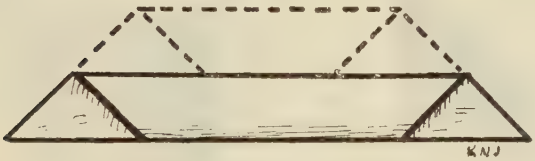


FIG. 21.—Broad bandage.

FIG. 22.—Narrow bandage.

up a hem at the base if it should not be convenient to use the folded medium or narrow sizes.

One of the most common forms in which it may be used is that of the large arm-sling.

Large Arm-Sling.—Stand in front of the patient. Place one end of the bandage over the shoulder on his sound side. Bring it around the neck to appear over the other shoulder. The apex of the bandage should be a little above the level of the elbow on the injured side. Now raise the arm to be slung into the required position of flexion so that it lies in front of the bandage. Maintain it there by bringing the other end of the bandage up to the shoulder of the injured side, where it should be tied to its fellow end—preferably making the knot in front. The

apex, which should now be above and behind the elbow, may be brought forward and attached to the bandage in front (Figs. 23, 24).

FIGS. 23 AND 24.—THE LARGE ARM-SLING.

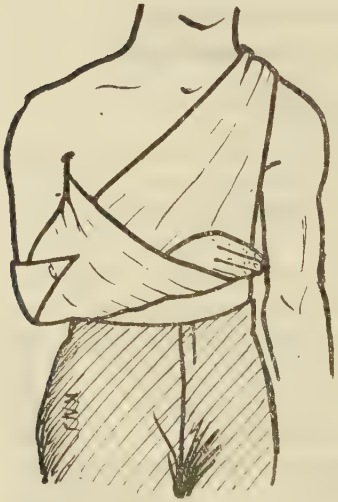


FIG. 25.—ARM-SLING FOR FRACTURED RIGHT CLAVICLE.

Arm-Sling for Fractured Clavicle.—When using the large arm-sling for fractured clavicle, the end of the bandage is passed under the armpit on the injured side so as to avoid all pressure on the broken bone (Fig. 25).

The Head.—Make a hem at the base about 2 inches wide. Stand behind the patient, and lay the middle of the base, with the hem outwards, upon the centre of the forehead. Bring the two ends to the back of the head, which is covered by the apex, where they should cross one another and go forward to be tied together over

the forehead. Draw down the apex firmly and turn it upwards, securing it to the bandage at the top of the head (Figs. 26, 27).

FIG. 26.

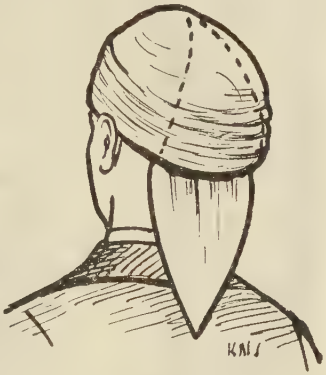


FIG. 27.

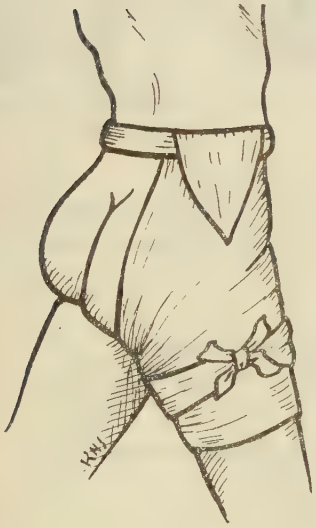


FIG. 28.

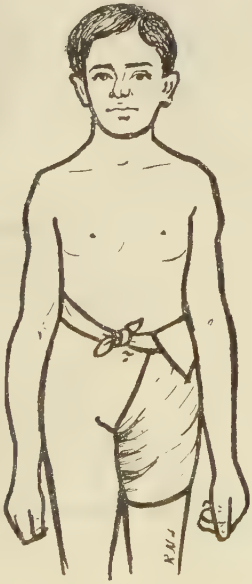


FIG. 29.

The Hip.—For this two bandages are required, one narrow and one unfolded. Place the narrow bandage around the body and tie it there. Apply the centre of the unfolded bandage to the hip, with the base well down on the thigh and its apex facing upwards. Carry

the ends around the thigh, cross them, bringing them forward again to be tied at the outside. Pull up the apex firmly underneath the folded bandage and turn it down, securing it below (Figs. 28, 29).

FIG. 30.—BANDAGE FOR THE KNEE.

FIGS. 31 AND 32.—BANDAGE FOR THE ELBOW.

BANDAGE FOR THE HAND.

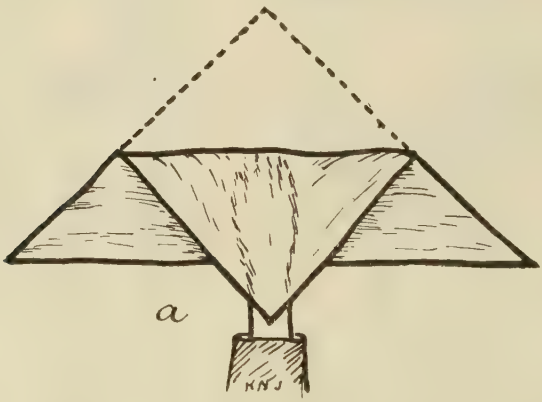


FIG. 33.

The Hand.— Spread the bandage flat upon a table with its base towards the patient. Lay the palm flat upon the bandage

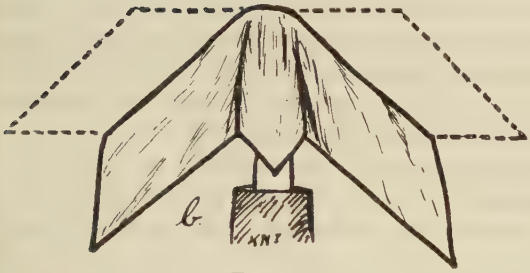
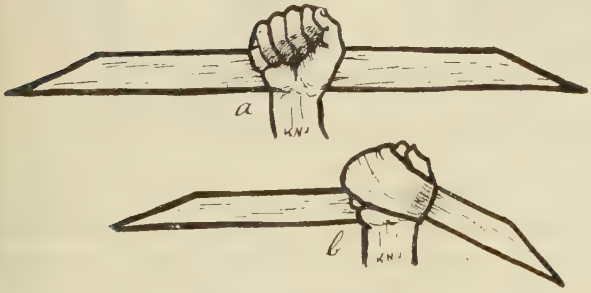


FIG. 34.

FIG. 35. FIG. 36.

FIG. 37.

BANDAGE FOR THE CLOSED FIST.



FIGS. 38 AND 39.

FIG. 40.

FIG. 41.

and about 3 inches from its base. Bring the apex towards the patient and so cover the back of the hand and part of the forearm. Take the two ends, cross them at the back, to bring them forward, and again bring them to the back of the forearm, where they should be tied (Figs. 33, 34, 35, 36).

Another bandage for the hand is shown in Fig. 37.

The **roller bandage** is made in several widths and lengths, according to the requirements of the different parts of the body. These vary from ¾-inch in width and 18 inches in length for the finger, to 6 inches wide and 8 yards in length for the body. The names " head " and " end " are applied to the rolled and loose

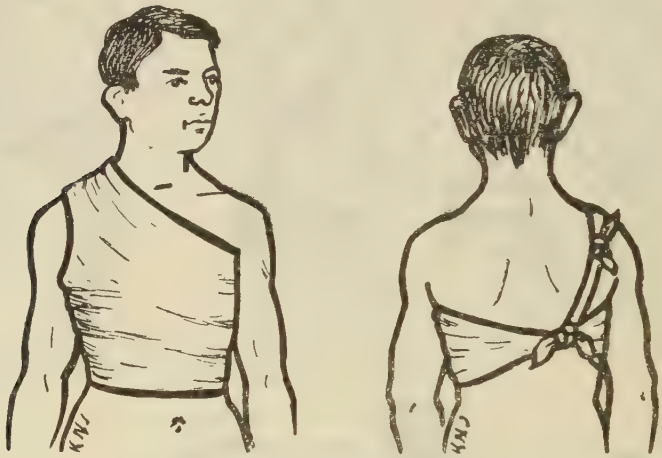


FIG. 42.—BANDAGE FOR THE BREAST.

parts respectively. The two sides are designated " inside " and " outside."

As a bandage is useless unless it remains in the required position, certain rules should be followed during its application:

1. Lay the outside of the end upon the patient's skin, and fix with the first turn.

2. Bandage from within outwards over the front of the limb, and from below upwards.

3. Each turn should overlap two-thirds of the preceding turn.

4. Use the same pressure throughout, and keep the margins parallel to one another.

5. All reverses and crossings should be in the same line, and situated preferably upon the outer aspect of the limb.

6. Make the bandage secure with thread—not with pins.

7. When a bandage has been fixed immediately after an injury, watch the fingers or toes at intervals for signs of congestion or bloodlessness. Should either of these appear, loosen the bandage, or gangrene of the part may follow.

8. The " figure-of-eight " is to be preferred to the " reverse."

When starting a bandage the fixation may be accomplished by unfolding a few inches; then place the end against the inner

FIG. 43.—FIGURE-OF-EIGHT.

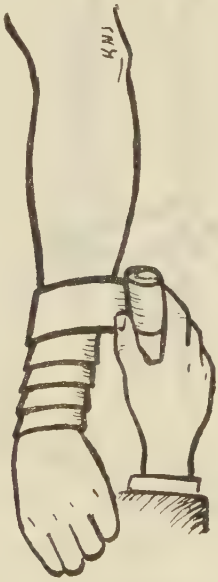


FIG. 44.—SPIRAL.

aspect of the limb, and at a higher level than that at which the first turn is to be made. Put the left forefinger firmly against the end and unroll the head downwards and outwards until the required level is reached; next make a spiral turn which will come round and cover the oblique part, to hold it in position. The bandage may then be continued in an upward direction.

One of three main patterns may be followed, according to the shape of the affected part: (1) The spiral; (2) the figure-of-eight; (3) the recurrent.

The **spiral** (Fig. 44) is the bandage usually applied to that part

of a limb presenting equal dimensions. It is merely a continuation of the bandage in a spiral manner upwards. On reaching a thicker part of the limb this form has to be altered, otherwise loops will appear at the back and the bandage will be insecure. The **reversed spiral** (Fig. 45) pattern must then be adopted. When making a reverse, steady the lower margin of the bandage with the left forefinger against it and the limb, hold the head lightly and unfold a little. Reverse the head so that the bandage

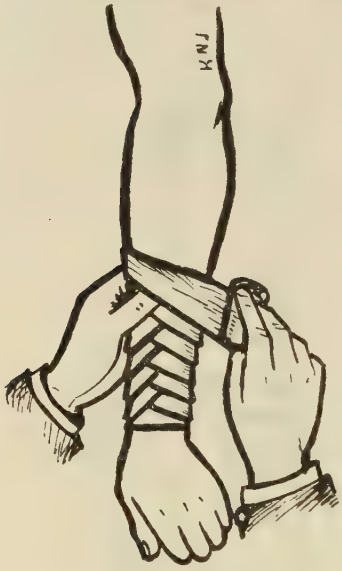


FIG. 45.—REVERSED SPIRAL.

FIG. 46.—FIGURE-OF-EIGHT.

turns on itself in a downward direction and will show the outer instead of the inner aspect as hitherto. Make a turn around the limb, and on reaching the first reverse do another similarly.

The **figure-of-eight** (Fig. 46) is useful for carrying a bandage over a joint.

An adaptation of it is called the **spica,** which may be put on in an ascending or descending fashion—the ascending (Fig. 47) and descending spica. These are of value for the shoulder and hip. Should a large prominence have to be bandaged, it will become necessary to adopt the methods known as the convergent (Fig. 49) or divergent (Figs. 50 and 51) spica.

FIG. 47.—SPICA FOR THE SHOULDER.

FIG. 48.—SPICA FOR THE FOOT.

BANDAGE FOR THE KNEE.

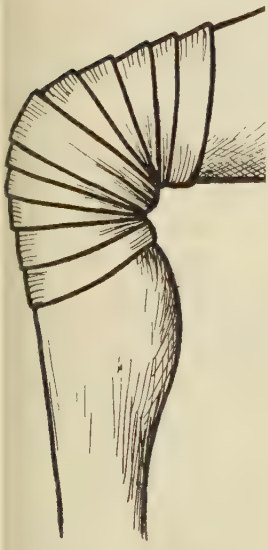


FIG. 49.—Convergent Spica.

FIG. 50.—Divergent Spica (beginning).

FIG. 51.—Divergent Spica (finished).

BANDAGE FOR THE FINGERS.

FIG. 52.

FIG. 53

Finger Bandage.—Start on the inner side of the back of the wrist, leaving an end long enough to tie to the other end on the completion of the bandage Run the bandage around the wrist and up the back of the hand to reach the tip of the finger. Should several require bandaging, the one nearest to the little finger should be the first to be done, and from its tip towards the base.

FIG. 54.—SPICA BANDAGE FOR THE THUMB.

On completion of one finger, the bandage should be carried down the back of the hand towards the wrist, but to the opposite side of that from which the run-up was made. A turn may then be made at the

wrist, and the run-up to the next finger accomplished as before (Figs. 52, 53).

The spica may be adopted for the ball of the thumb. It will require a bandage of about 1 inch in width (Fig. 54).

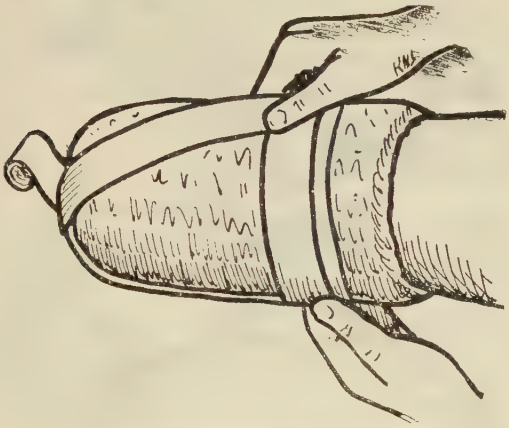


FIG. 55.—RECURRENT BANDAGE FOR STUMP.

FIG. 56.—CAPELINE BANDAGE.

The bandage for the hand and forearm, may be started in the form of a figure-of eight, by placing the end on the front of the wrist and sweeping round the back of the hand obliquely. A horizontal turn should then be made over the fingers, leaving their tips and the thumb exposed. The bandage may then be

continued in a figure-of-eight fashion until the wrist is reached, where the spiral form can be adopted and continued as such up the forearm, until the reversed spiral becomes necessary.

FIG. 57.—CAPELINE BANDAGE.

The **recurrent** bandage may be used for covering the tips of stumps, fingers, or toes. The bandage is first fixed at a little distance from the tip. A loop is then brought over the middle

FIG. 58.—CAPELINE BANDAGE.

of the stump, the ends of which are held by the thumb and forefinger of the left hand. Further loops are brought over the tip, a little to the side of the first one, but converging to the same point as that of starting. When the whole stump has

been covered, a few circular turns will suffice to fix the loop ends in position (Fig. 55).

A modification of the recurrent bandage, in the form of the **capeline,** may be used for covering either one-half or the whole of the head. A double-headed bandage about 2 inches wide is necessary. This may be made by sewing the ends of two bandages together. Start on the forehead, having a head of the bandage in each hand. Sweep backwards where the bandages will meet, continue one right around the head. The other

KNOTTED BANDAGE FOR THE HEAD.

FIG. 59.

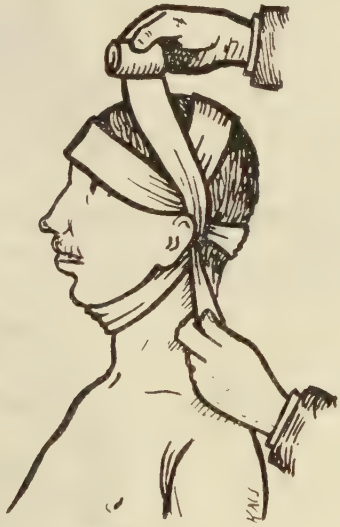


FIG. 60.

lying under the first, can be looped over the head to the forehead, where it again meets its fellow, and where the same procedure of looping can be repeated in a backward direction (Figs. 56, 57, 58).

The **knotted bandage** is a most useful one for the head. Hold the end in the left hand, placed near the temple. Make a sweep around the head with the roller, and twist under the end of the bandage, making a loop over the head. From thence it should go under the chin, and again twisting around the end, proceed over the head and around the occiput at the back of the head. When the required amount is covered, bring the bandage directly forward from behind, and secure all the others to this loop (Figs. 59, 60, 61).

The capeline and knotted bandages for the head are apt to be hot and uncomfortable for the patient, and the triangular bandage for the head is preferable, if it retains the dressings as well.

FIG. 61.

Bandage for the Eye.—A figure-of-eight bandage is useful for the eye. The ear on the injured side may be covered, care being taken to leave the other ear and eye free (Fig. 62).

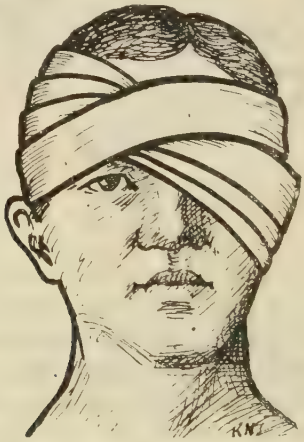


FIG. 62.—BANDAGE FOR THE EYE.

It is now necessary to draw attention to the **tailed** and **T-shaped** bandages.

The former may be of the four or many-tailed variety. The four-tailed bandage is frequently used for the jaw and head.

In applying the bandage to the jaw, make a slit of about an inch in a piece of calico about 1 yard long and a few inches wide. Divide the bandage up each end to within a couple of inches

FIG. 63.—FOUR-TAILED BANDAGE FOR THE HEAD.

of the slit. The slit should then be placed over the point of the jaw, and the two upper tails carried to the back of the head and

FIG. 64.—FOUR TAILED BANDAGE FOR THE HEAD.

tied together. The two lower ends should be brought to the top of the head and tied there. For greater security, the ends of the upper tails may be tied to the opposite ends of the lower tails.

In a similar manner, a bandage of greater width may be utilised for covering the back and front of the head (Figs. 63, 64, 65).

FIG. 65.

The many-tailed bandage may be made by taking a strip of bandage and sewing to it at right angles several other strips,

MANY-TAILED BANDAGE FOR LEG.

FIG. 66.

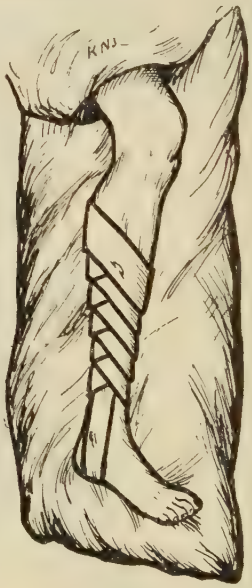


FIG. 67.

which will become the tails. The middle of these should be sewn to the central piece in such a manner that each strip over-

laps one-third of its predecessor. This bandage is frequently used for the trunk of the body, but it may also be used for a limb. In applying it, place the central strip behind, and fold the tails firmly over the limb to meet the corresponding tails from the other side. Owing to the overlaps, they can be secured by stitching the two top tails together and to those just preceding them. The bandage is readily taken off by disconnecting the stitches, and is of value when frequent dressings and rest are essential (Figs. 66, 67).

The T-bandage may be used in the form of a single T or a double T. It is employed chiefly for retaining dressings to the

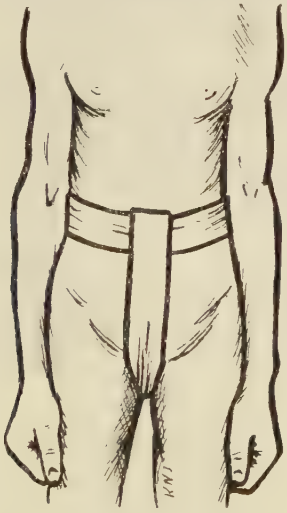


FIG. 68.—T-BANDAGE.

perineum, but it may also be used for the face, head, and hand. In the case of the perineum, the horizontal portion goes around the body, and the one or two ends come forward between the legs and are fastened to the horizontal portion in front (Fig. 68).

BLEEDING.

Hæmorrhage may occur as the result of injury to or disease of a bloodvessel, and the nature of the bleeding varies somewhat according to the type of vessel affected.

Arterial hæmorrhage is of a bright red colour. It occurs in jerks corresponding to each beat of the heart.

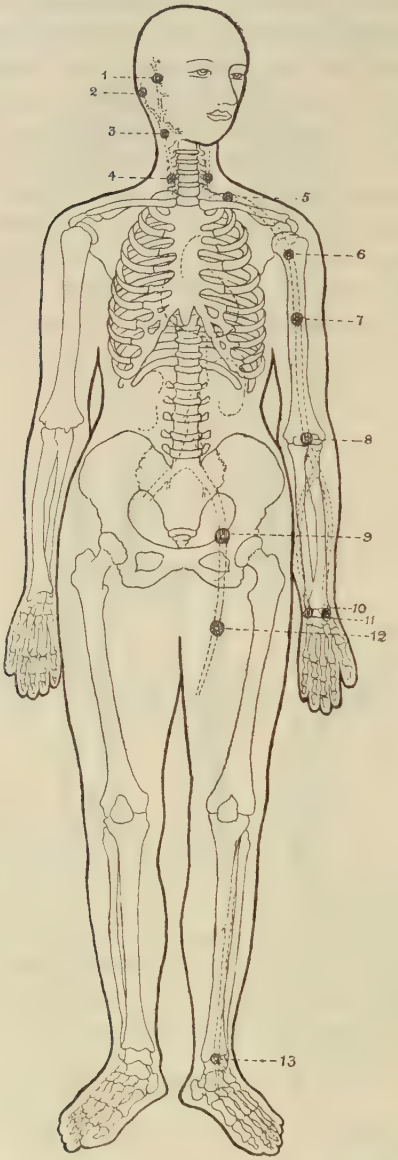


FIG. 69.—POINTS WHERE PRESSURE MAY BE APPLIED TO CHECK HÆMORRHAGE.

1, Temporal; 2, occipital; 3, facial; 4, carotid; 5, subclavian; 6, axillary; 7, 8, brachial; 9, 12, femoral; 10, radial; 11, ulnar; 13, anterior tibial.

Venous hæmorrhage is dark red in colour. The blood wells up from the wound, and the bleeding is not jerky, but continuous.

Capillary hæmorrhage is usually bright in colour, and it consists of a general oozing.

Wherever hæmorrhage is seen, an immediate and vigorous effort should be made to control it. Pressure over the bleeding-point will check the most serious rush of blood for the time being. If a clean pad of gauze or lint be available it should be used, but if the bleeding is urgent it is quite justifiable to use the naked hand or to hold a spouting vessel with the fingers until means for its permanent arrest can be arranged.

If the exact bleeding-point can be seen by means of wiping away the blood quickly, it may be possible to seize the bleeding

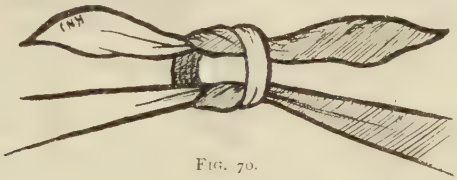


Fig. 70.

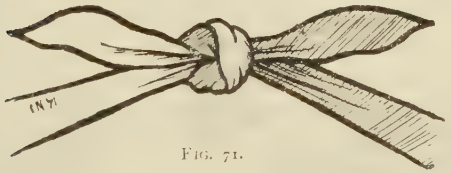


Fig. 71.

Figs. 70 and 71.—Reef Knot.

vessel with an artery forceps, which can be left attached until the arrival of medical help. Should no exact bleeding-point be seen and one of the limbs be the part affected, the limb should be raised and bandaged tightly, a firm pad having first been placed over the seat of hæmorrhage. Any constricting bands higher up, such as garters, which would interfere with the venous return, should be removed.

If the affected bloodvessel is an artery of large size this procedure will not be sufficient. It will then become necessary to apply pressure to the artery above the injury. A **tourniquet** will prove most effective. There are many kinds of tourniquet —one made of elastic tubing and known as Esmarch's is the simplest and best. Should this not be available, a handkerchief or bandage may be tied around the limb with a pad over the

artery. A short and stout stick must then be inserted under the bandage, and pressure exercised by twisting it. The stick can be prevented from untwisting by a few turns of a bandage over it and the limb.

A word of warning is necessary with regard to all tourniquets. They are liable to cause permanent damage to the bloodvessels and nerves; therefore they should only be used when digital (finger) pressure fails, and even then the pressure should only be sufficiently tight to stop the hæmorrhage.

Clove Hitch—Half-made and Completed.

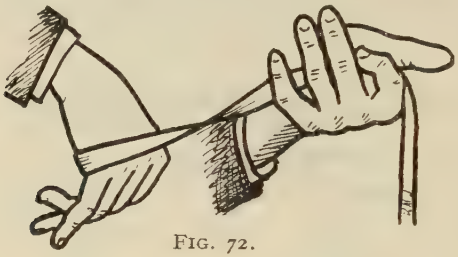


Fig. 72.

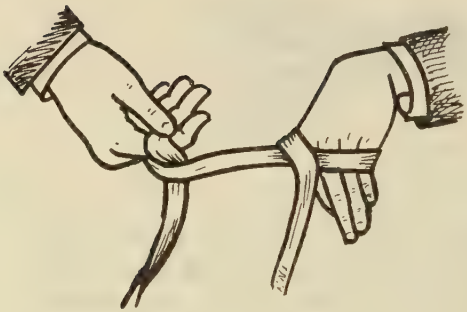


Fig. 73.

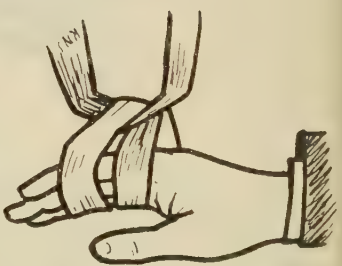


Fig. 74.

In tying a knot the " granny " type should not be used as it is liable to slip. Reef or surgical knots have not this disadvantage (Figs. 70, 71).

The clove hitch is useful when a strong pull on any part is required. It is easily loosened and does not slip (Figs. 72, 73, 74).

If the hæmorrhage is not from a limb, the application of a tourniquet will not be possible. In such a case digital pressure may be employed after covering the wound with a pad. This will prove extremely tiring, and will require a number of assis-

tants for relief. Instead of fingers, a well-padded key handle may be utilised. Indeed, this is almost essential in hæmorrhage from the subclavian artery, pressure being made downwards behind the clavicle to compress the vessel against the first rib.

Carotid Hæmorrhage.—Digital pressure low down in the neck is required, the vessel being found along the front edge of the sterno-mastoid muscle and compressed against the cervical vertebræ.

Radial and Ulnar Hæmorrhage.—These may be compressed against their corresponding bones. It will probably be necessary to compress both vessels simultaneously in order to control hæmorrhage from one of them. Should this fail, compression of the brachial artery should be tried.

This may also be necessary for hæmorrhage from the hand, as the radial and ulnar arteries are situated on the inside of their respective bones, and therefore a tourniquet applied to the forearm is of little use. The same remark holds good for the region of the tibia and fibula, though to a less extent.

Femoral Hæmorrhage.—If the wound be high up in the thigh, the artery may be compressed against the brim of the pelvis. Both thumbs—one above the other—are required to obtain sufficient pressure. If the wound be lower in the limb, a tourniquet can be applied. In the case of hæmorrhage near a joint, considerable pressure may be obtained by flexing the joint over a large pad.

Capillary Hæmorrhage.—Hot water, at a temperature of from 110° F. to 120° F., is useful in checking capillary hæmorrhage. An antiseptic solution may be added to it with advantage.

Cold applications are sometimes used for capillary hæmorrhages. Certain substances, known as styptics, retard bleeding. One of the best is adrenalin—a substance obtained from the adrenal glands. It acts by constricting the bloodvessels. Friar's balsam and tincture of iron have been used for the same purpose, but they are not so satisfactory.

Internal Hæmorrhage.—It must be remembered that the most fatal hæmorrhage may be unseen. This internal hæmorrhage may take place into one of the large cavities of the body, and the patient may bleed to death within a short time. The main symptoms are rapid loss of strength, extreme pallor, markedly increased rate of pulse, and restlessness. Fainting may occur. The temperature becomes subnormal.

The first thing to be done, as in all serious emergencies, is to send for the doctor. While awaiting his arrival an effort should

be made to secure an ample supply of blood to the vital organs of the body. This may be attained by bandaging the limbs, and elevating the foot of the bed. Water may be administered, but stimulants should be avoided. An ice-bag may be placed over the position of the hæmorrhage, should that be known. A free supply of fresh air must be admitted into the room.

Directions may be given to have the blood transfusion apparatus ready in case the doctor should require it. If the emergency should take place at some distance from medical help, a nurse would be justified in giving a saline injection by the rectum. A description of this will be found later in the book (see p. 206).

Reactionary Hæmorrhage may occur some little time after the primary hæmorrhage has ceased. Its appearance coincides with the recovery of the patient from the shock of the injury.

Secondary Hæmorrhage may occur any time after the first twenty-four hours, but usually a week or ten days elapse before its appearance. It is caused by sepsis.

Hæmorrhage from the Nose (Epistaxis).—In a case of this kind, the patient should be made either to stand very erect or to sit down on a chair with his head thrown backwards. The arms should be raised above the head. The nurse should undo any tight clothing about the neck and chest, and apply something cold to the back of the neck. Should the hæmorrhage persist, a doctor should be sent for. In simple cases, breathing hard, in through the nose and out through the mouth, is of service.

Hæmorrhage from the Lungs (Hæmoptysis) usually occurs as a result of tuberculosis. It is important to distinguish the blood in this condition from that which comes from the stomach. In hæmoptysis it is of a bright red colour and frothy in appearance. It is coughed up without, as a rule, any feeling of sickness.

Treatment.—Send for a doctor. Place the patient in a recumbent position with his head and shoulders raised. Loosen all clothing around his neck and chest. Do not allow him to talk. Keep him absolutely at rest, and give him sips of cold water, preferably with ice in it.

Hæmorrhage from the Stomach (Hæmatemesis) shows itself by the vomiting of blood which may be either bright or of a dark, coffee-grounds colour. There is usually a feeling of faintness beforehand. The blood is not frothy, and it is liable to be mixed with particles of food. Such hæmorrhage may be

followed by the passage of very dark blood with the motions (melæna).

Treatment is the same as that of hæmoptysis. Ice, or lint that has been soaked in cold water, may be applied over the stomach.

THE EMERGENCY TREATMENT OF WOUNDS.

Wounds may be divided into four kinds: incised or clean-cut, lacerated or torn, contused or bruised, and punctured.

The result of any wound depends largely upon the treatment given by the person who first deals with it. As a general rule, the less first-aid interference there is the better will be the result. Naturally, the stoppage of hæmorrhage must be secured by one of the methods already described. The next important point is to prevent the entry of micro-organisms. The importance of disinfecting one's hands cannot be over-estimated; so, before approaching any wound, the nurse should wash them carefully with soap and water, making good use of a nail-brush, and then immerse them for a few minutes in an antiseptic solution. Circumstances may arise when these measures are not practicable; should profuse hæmorrhage occur, we must make an immediate effort to stop it, and must secure disinfection at a later period.

When the hands have been disinfected, they should not be dried or allowed to touch anything that has not been disinfected, or they will become reinfected. Soiled dressings and clothes may be removed by some other person, while the nurse confines herself to dealing with the wound and clean dressings. For the disinfection of the former, tincture of iodine may be poured over both it and the surrounding skin. If some other antiseptic be used, the wound must be kept covered with a piece of gauze which has been soaked in the antiseptic, while the surrounding skin is being cleansed. Next, the wound itself must be similarly disinfected.

The next consideration is the application of a dressing. Boric powder may be dusted over the wound and covered with a piece of gauze or lint, on the top of which cotton-wool should be laid and a bandage applied.

In the absence of clean dressings they may be improvised by boiling a piece of linen or cotton. Scorched paper or the inside sheets of unused notepaper may also be employed

The first dressing may be left undisturbed for forty-eight hours, unless there should be some indication of trouble. A rise of temperature or hæmorrhage may necessitate earlier interference. If the bandage should prove uncomfortable, it may be loosened without removing the inner dressing.

METHODS OF ARTIFICIAL RESPIRATION.

In all cases necessitating this procedure, the mouth should first be forced open with a gag or key, and any foreign body found obstructing the breathing should be hooked out with the finger. Make certain that the clothing about the neck and body will not interfere with free breathing. In the case of the apparently drowned, lay the body face downwards, clasp your hands under the abdomen, and raise it so that any water in the air passages may run out. During the process of artificial respiration, the patient must be covered up as much as possible to prevent loss of heat.

Schäfer's Method.—Loosen all tight clothing. Lay the patient face downwards with the head turned to one side, with the cheek resting on the forearm of the same side. In this way the mouth and nose are kept off the ground. Kneel at one side of him, or astride his buttocks, and place the palms of your hands flat on each side of the back of the lowest ribs. Throw the weight of your body upon your hands, applying firm pressure. This causes expiration. Without removing the hands, relax the pressure upon them by straightening your body back to the upright position. This will induce inspiration. Repeat these movements every four seconds until respiration is established. This method is especially useful in the case of the apparently drowned.

Sylvester's Method.—Lay the patient on his back. Remove clothing down to the waist. Place a cushion under the shoulder-blades. Pull the tongue forward with a forceps or by grasping it with a towel. The tongue will have to be held forward by an assistant. Grasp the forearms and pull them up and out to above the head, while counting a slow four. This movement induces inspiration. To induce expiration, bring the arms back to the sides with the forearms flexed across the chest, and firmly compress the ribs—while again counting a slow four.

Howard's Method.—This is useful when an arm is broken. Deal with the tongue as in Sylvester's method, and place a roll of clothing under the body so as to raise the abdomen above the level of the head. Sit astride the hips, with your hands upon the pit of the stomach and fingers upon the lower ribs. Throw your body weight upon your hands while squeezing the lower ribs inwards and upwards for a count of a slow four. Then spring up suddenly and count another four.

Laborde's Method.—Useful if ribs are broken. Place the patient on his back, seize the tongue and pull it forward fairly vigorously, counting a slow four. Let the tongue fall back, while again counting four.

Whatever the form of artificial respiration, it should be kept up for at least two hours by nurses taking turns. Should the patient begin to breathe naturally, he should be under observation for some hours. Promote the circulation by rubbing the limbs towards the heart with a towel. Cover the patient with warm blankets, and apply well-protected hot bottles.

SOME EMERGENCIES.

A patient may be seen to fall to the ground, or may be found lying there. He may be conscious, confused, or unconscious. He may be pallid and pulseless, or flushed and with a full pulse. He may be breathing heavily or apparently not at all. He may be quite still, or restless, or convulsed. At first sight it is not easy to tell what is wrong, still less what to do. But a glance will reveal much. If he is breathing freely, there is evidently no dangerous obstruction to respiration. If his pulse is good and regular, he will probably not die immediately from want of help from a nurse. If there is obvious bleeding, or signs of burning about the mouth from poisons, the indications are equally obvious. But if none of the above give any information, then the nurse should leave the patient alone, lying where he is until the medical officer arrives. Interference can do no good, and in at least one case—viz., cerebral hæmorrhage—the result of lifting him on to a sofa may be fatal. If the patient is conscious he may be able to tell what is wrong, and if he has pain in the buttock or thigh his femur may be fractured, and it is equally important not to move him. But supposing the

patient appears unconscious, the condition present may be any of the following:

Shock, collapse, fainting, injury or disease of the brain, epilepsy, sunstroke, suffocation, poisoning. A general routine of treatment applicable to every case is:

The nurse should—

1. Send for the doctor.
2. Lay the patient on his back.
3. Open the mouth and pass a finger to the back of the tongue to feel for a foreign body.
4. Undo all tight clothing.
5. Give free ventilation.
6. Note whether the respiration is free and regular, whether stertor is present, and whether air is entering the lungs.
7. Note the frequency, fulness, and regularity of the pulse.
8. Note the temperature of the skin and the colour of the face.
9. Observe the size and the equality or otherwise of the pupils, also whether they react to light.
10. Retention or incontinence of urine and the involuntary passage of fæces should also be noted.
11. Examine the head, joints, and limbs for signs of injury.
12. Keep the patient warm.
13. Scrutinise the surroundings for evidence of the cause of the illness. An empty bottle may suggest poisoning.

Shock may result from severe injury, great mental strain or emotional disturbance, loss of blood, and pain.

Pallor, a feeble pulse, subnormal temperature, clammy skin, shallow respiration, and yawning are its chief symptoms. The patient remains conscious but is listless. This condition may pass into coma and death.

Treatment.—Keep the patient warm. Give hot drinks and stimulants unless there is reason to believe that hæmorrhage is going on. Elevate the foot of the bed.

Electric Shock.—The patient may not be able to remove himself from contact. Should a nurse not himself insulated attempt to pull him away he also will become affected. If a piece of dry wood be near, he should stand upon it while moving the patient, and not touch the ground with any part of his body, or he may wrap a thick dry cloth around his hands and with a stick or broom-handle push him out of contact. When contact

is broken artificial respiration may be necessary, and many persons apparently dead may be revived by prompt and persistent artificial respiration. Burns, if any, should be treated in the usual way.

Collapse resembles shock, but as a rule its onset is more gradual. Any exhausting illness, such as pneumonia, diarrhœa or cholera, hæmorrhage or persistent vomiting, may be the cause. Loss of fluid is an important factor.

Treatment.—The treatment of collapse is similar to the treatment of the disease causing it. The replacement of fluid may be hastened by saline injections through the rectum or subcutaneously. Warmth, given by carefully protected hot-water bottles and hot drinks, will be useful.

Fainting.—The patient becomes unconscious, with pallor of the face and lips. The respiration and the pulse are feeble, and the skin is cold and moist. The condition is due to a deficient circulation of blood in the brain, resulting from such circumstances as illness, bad news, fear, and unpleasant smells or sights.

Treatment.—Lay the patient flat on the back with the head low. Loosen tight clothing. Raise the feet and give free ventilation. Smelling salts may prove useful. Make certain that the patient is not choking.

Injury to the Brain.—Concussion of the brain, or stunning, may be caused by a fall or severe blow upon the head. The symptoms depend largely upon the severity of the accident. Unconsciousness is the chief feature, and usually it is accompanied by relaxation of the muscles of the body. The skin is cold and clammy, and the pulse and respiration are slow.

As a general rule, a lessening of the unconsciousness soon appears, accompanied by an increased rapidity of the pulse and respiration, or there may be some movement of the body. The patient will probably return to complete consciousness, but this must not always be taken as a sign of definite recovery, as he may subsequently grow drowsy and apparently sleep. The breathing may become stertorous in character, and signs of compression of the brain supervene—followed by death, as a result, perhaps, of hæmorrhage within the cranial cavity. Therefore a gradual slowing of the pulse and increasing drowsiness are symptoms of danger.

Treatment.—Having sent for the doctor, the nurse must put the patient to bed, keeping the head low. Hot-water bottles,

well protected, may be applied to the extremities. Stimulants should not be administered in case hæmorrhage may be occurring within the cranium.

Compression may be due to any condition which raises the pressure within the skull. Such conditions are hæmorrhage, a depressed fracture, inflammation, and tumour or abscess. The chief symptom is unconsciousness, from which the patient cannot be aroused. There is a slow pulse, and the breathing is slow and stertorous. The pupils may be dilated and unequal in size. Retention of urine commonly occurs.

Treatment resembles that of concussion, but the state of the bladder and bowels will require attention, as the condition may last for weeks. Unless the cause should be a small hæmorrhage the outlook is bad.

Apoplexy and Hemiplegia are conditions resulting from the rupture of an artery in the brain. Intracranial hæmorrhage may cause partial or complete unconsciousness of sudden onset. The patient may fall.

Treat as for concussion, being careful to avoid stimulants.

Collapse from Drink.—Symptoms of poisoning may follow the consumption of a large dose of alcohol. The patient falls into a state of collapse, and coma rapidly ensues. The pupils are dilated.

Treatment.—Try to rouse the patient. An emetic of mustard-and-water may be administered. As the doctor will probably think it necessary to wash out the stomach, prepare for this. Apply hot bottles, and administer coffee by the rectum.

Epilepsy may occur in two forms, petit mal and grand mal. In petit mal there is a momentary loss of consciousness, which may only show itself by a change of colour, cessation of the occupation of the moment, or a vacant look. Recovery takes place in a few seconds. In grand mal there is a series of stages: (1) Sudden and complete unconsciousness; (2) tonic spasm frigid contraction of muscles); (3) clonic spasm (convulsive twitching of muscles); (4) exhaustion, coma, and gradual recovery.

Treatment.—Lay the patient on the floor. Place a pillow under the head. Loosen the clothing. See that respiration is not impeded. Examine the mouth for artificial teeth, and food, and remove them. Prevent injury to any part during the convulsions. Place something between the teeth to protect the tongue.

Convulsions of a somewhat similar nature may occur in

general paralysis of the insane, apoplexy, tetanus (lockjaw), strychnine poisoning, and rabies (hydrophobia). In such attacks, however, there is not the same order in the sequence of events.

Hysteria is a disease which mimics many other diseases, and often simulates fainting or epileptic "fits," thereby causing alarm and calling for first aid. The pulse, however, will be found regular. The patient, if left unnoticed, returns to his normal state. On recovery from a hysterical attack of "fits," he should be treated with firmness and kindness, all expressions of undue sympathy being withheld, as they may lead to a recurrence of the condition.

Treatment.—In any doubtful case, treat as for the more serious condition.

Effects of Heat, Cold, and Chemicals.—Sunstroke may follow exposure to the direct rays of the sun, or it may be the result of work carried on in a high temperature. The latter is sometimes called heat-stroke.

The patient feels faint and may stagger. Collapse is liable to ensue. The skin is clammy. There is throbbing of the head, and great thirst. The pulse is rapid and feeble, and the temperature is exceedingly high.

Treatment.—Remove the patient to a cooler place. Loosen his clothing. Apply ice to his head, or bathe it with cold water. If he should be conscious, place him in a semi-recumbent position and sponge the limbs. Give him ice to suck, or sips of cold water, and keep a careful watch on the temperature. Patients who have suffered from sunstroke should avoid stimulants, heat, and sun as much as possible.

Frost-Bite is liable to occur in the extremities and exposed parts, such as the ears and nose. No pain is felt at first, so the patient may not be aware of his condition until his attention is drawn to it. The affected part appears hard and shrunken, and is white in colour. Gangrene, or local death, may follow quickly, or it may occur at a later period from inflammation, especially should thawing have been injudiciously hastened.

Treatment.—Gently rub the affected part with snow. Avoid heat at first. The room should be cool, and its temperature should only be raised gradually. Later, a small amount of warm drink may be given, and cotton-wool applied over the affected part after the skin has been disinfected.

Burns and Scalds may be caused by fire, dry heat, steam, boiling fluids, certain chemicals, and electricity. They may be divided into six degrees of severity: (1) Redness. (2) Blistering. (3) Partial destruction of the skin. (4) Complete destruction of the skin. (5) Implication of the muscles. (6) Charring of the whole limb or part of the trunk.

Treatment.—Exclude the air by covering the burn with a bland powder such as boracic acid, or, less good, baking soda (bicarbonate of soda). Next, add a covering of lint or cotton-wool. If there should be blistering, picric acid in a strength of about 1 to 100 will be found one of the best dressings. Strips of lint that have been soaked in it should be applied, overlapping one another. If one large piece of lint is used, it is liable to cause a greater amount of shock when being changed. Blisters may be pricked with a sharp pair of clean scissors, and the serum pressed out with a piece of cotton-wool.

A saturated solution of bicarbonate of soda is a soothing application in superficial burns, as is a 25 per cent. solution of Epsom-salts in all classes of burns. Should neither of these be available, the part may be covered with a bland oil, vaseline, or cold cream. Do not remove clothing that may be adherent to the skin. Cut away as much as possible and soak the remainder with solution of picric acid or whatever fluid dressing is in use. Be careful to treat the patient for shock, which is a very common cause of death in this condition.

If the material is available, the best treatment for burns is to cover them with a specially prepared paraffin wax. This is melted, and either sprayed on, or applied with a large soft camel-hair brush. When a large area has to be covered, very thin layers of cotton wool are applied along with the wax. These dressings do not adhere to the wound, and can be changed with the least possible discomfort to the patient.

Scalding of Throat.—Suicidal patients are liable to adopt this method, through inhaling steam from the spout of a boiling kettle. Symptoms of choking at once ensue, which may necessitate tracheotomy at the hands of a surgeon.

Treatment.—As suicidal patients may not suck ice even when it is available, hot fomentations followed by a glycerine compress should be applied to the neck, and the fauces swabbed out with boro-glycerine. The patient should be kept in a warm room,

and preparations made for the opening of the trachea by the doctor.

Burning by Chemicals will follow the contact of the skin with a strong acid or a strong alkali. Amongst the former are hydrochloric, sulphuric, and nitric acids. Caustic potash and caustic soda are examples of the latter.

Treatment.—In the case of acid burning, immediately and forcibly drench the part with large quantities of water, to which preferably some bicarbonate of soda, lime water or ammonia has been added. For alkali burns, vinegar may be added to the water instead of the materials just mentioned. Should the part affected be a limb, it should be moved rapidly through the water to get away the chemical as quickly as possible. Then apply a dressing of an oily nature.

Bites and Stings.—Dog-Bites may cause hydrophobia if the animal should happen to be rabid—in which case the patient should be treated in a special institution, such as that founded by Pasteur.

Treatment.—If a finger is the part affected, a piece of string may be tied around it to stop the venous circulation. Bleeding can be encouraged by pressure from below upwards towards the wound. The part may be cauterised with nitrate of silver.

Cats sometimes cause infective wounds, which may be treated similarly to those caused by dogs. Later, an antiseptic dressing should be applied.

Snake-Bites.—Should the snake be of a poisonous variety, an immediate excision of the wound is necessary; therefore send for a doctor, and compress the limb tightly with a tourniquet. Suck the wound and spit out the blood. Shock may follow the bite, and necessitate the free use of stimulants or even of artificial respiration. The injection of a strong solution of permanganate of potash into the actual wound and surrounding tissues has proved a useful measure.

Stings of Insects.—These are liable to be followed by shock, and occasionally death has occurred as a direct result.

Treatment.—Squeeze the part tightly to eject the sting or poisonous fluid. Next apply one of the following: A strong solution of bicarbonate of soda; household ammonia; peroxide of hydrogen; permanganate of potash; alcohol. Ammonia is said to be particularly useful for bee stings, as is the application of a cut onion for those caused by a wasp.

Rubbing with a blue bag is a favourite domestic remedy, the active ingredient being bicarbonate of soda.

In case of much shock send for the doctor at once, apply heat in the form of protected hot-water bottles, and administer stimulants.

Fire.—It is only by constant vigilance that the occurrence of fires in a ward can be prevented. As in the early stages they are easily extinguished, every effort should be made to ascertain the cause of any smell of gas or fire. If it cannot be accounted for at once, a report should be made to a charge nurse. On the discovery of a fire, the first duty of attendants is to secure the safety of the patients under their care. In the case of a small fire, that end may be best attained by the immediate use of the fire-fighting appliances. But should the fire be a large one, or should smoke be in the vicinity of the patients, a prompt effort must be made to remove them to a safe place. It is a good rule to count them as they go out, thus making sure that none are left behind.

When entering a smoke-laden room, it is wise for a person to tie a wet handkerchief over his nose and mouth, and, if possible, get somebody to throw a bucket of water over him. As a general rule the air will be found less smoky near the floor, therefore he should bend low when going in. Special precautions should be taken to prevent the flames from reaching the head of any patient.

Artificial respiration may be needed after the rescue, and burns should receive every attention that may be possible at the moment.

If the clothes of a patient catch fire, he should at once be rolled upon the floor, both to extinguish the flames and to prevent them from reaching his face. A rug, blanket, or coat may be wrapped round him quickly as a further means of smothering flames, but the nurse must be very careful not to catch fire herself.

Suffocation.—Suffocation will occur when the supply of air admitted to the lungs is insufficient to maintain life.

It may be caused by the absence of ventilation, the presence of gases or thick smoke in the atmosphere, inflammation or disease of the tissues around the throat, hanging, choking, strangulation, and drowning.

The treatment consists of the immediate removal of the cause,

the admission of pure air, followed, if necessary, by prolonged artificial respiration.

Hanging.—Whenever a patient is discovered hanging, he should be instantly raised up, and the rope can then be cut and removed from his neck. Artificial respiration should be proceeded with and medical aid summoned.

Choking.—A patient who faints, at meals or elsewhere, may possibly be choking. Therefore, in all fainting attacks, pass a finger into the patient's mouth and find out if the epiglottis is free. Should a foreign body be felt, send for the doctor, and attempt to remove the obstruction by hooking a finger around it—the mouth being held open by a gag or key. In case of failure to dislodge the foreign body, the patient may be held legs uppermost and then clapped upon the back. After removal of the obstruction artificial respiration may be needed.

Strangulation.—Strangulation may be attempted by tying a string around the neck or by the voluntary pushing of a substance into the windpipe. In either case the obstruction to breathing must be removed at once and medical aid summoned.

The nurse should proceed with artificial respiration.

Drowning.—Send immediately for medical aid, stimulants, and dry clothing. Pass a finger into the mouth, and clear away any obstruction that may be present. Perform artificial respiration by Schäfer's method, and endeavour to get the patient warm. Do not leave him lying on his back without having his tongue held forward.

Cut Throat.—Check the bleeding-points by pressure against the vertebræ. It may be possible to seize some of them with artery forceps. Keep the head at a lower level than the body, to prevent blood from entering the windpipe, which is usually severed. When the bleeding has been controlled, place a light dressing over the wound, and proceed to treat the accompanying shock.

POISONING.

This serious condition will tax the resources of the most experienced nurse. Early recognition and prompt treatment are the golden rules to success. Whereas treatment is often unsatisfactory, and the chance of administering it does not come to every nurse, yet, within the hands of even the most junior

probationer there lies that still more potent weapon—the weapon of prevention. A strict watchfulness over his patients will prevent the accident from occurring either within or without the wards of a mental hospital. Should a nurse's vigilance fail him in this respect he will ever regret it if a case of poisoning should occur.

Certain substances which oppose the actions of poisons are known as **antidotes.** Unfortunately, many antidotes are required to cover the large number of possible poisons. Very often the name of the poison that has been taken is not known, and then a general antidote may be useful, as it possesses the advantage of neutralising several poisons. A well-known authority has recommended the following for the purpose:

Calcined magnesia,
Powdered wood charcoal,
Hydrous peroxide of iron.

Half an ounce of each of these may be given in a tumblerful of water every half-hour until three doses have been taken.

The next best thing to prevention is to place oneself in a prepared state for giving treatment should the necessity for this arise. It may be advisable for a nurse who is responsible for the care of any poisonous drugs to lay in a small store of requisites that would be useful in case one of these poisons should be swallowed. Mustard, oil, vinegar, bicarbonate of soda, washing soda, and the general antidote may be included. The necessary means for washing out the stomach should also be at hand.

Poisoning may be suspected in all cases of sudden illness, especially those occurring soon after food or drink has been taken.

General Treatment.—Send for the doctor and, if possible, mention the name of the poison used. Smell the patient's breath and look at his pupils. Examine his mouth to see if there are any signs of staining. Should none be present, administer an emetic of mustard or salt—one tablespoonful to the tumbler of water. A finger may be passed to the back of the throat to induce vomiting.

As washing out the stomach is applicable in many cases, a nurse should be sent to get the stomach-tube, funnel, gag, some large basins, and jugs of hot and cold water.

If the mouth should present signs of staining, do not give an emetic, but administer a quantity of olive or linseed oil, milk, or raw eggs.

Should the patient be drowsy, keep him roused, and if he is not breathing, perform artificial respiration. Retain all vomited matter, empty bottles found near at hand, or anything that should be inspected by the doctor.

THE MORE COMMON POISONS AND THEIR ANTIDOTES.

Poisons may be classified under five headings: **Corrosives, Irritants, Convulsants, Narcotics,** and **Gases.**

1. **Corrosive Poisons** are so called because they corrode any tissues with which they come in contact. The chief examples of this group are the strong mineral acids, such as sulphuric (oil of vitriol), hydrochloric (muriatic acid or spirit of salt), nitric (*aqua fortis*); strong alkalies, such as caustic potash, caustic soda, and ammonia; strong carbolic acid and oxalic acid.

Symptoms.—Staining of lips and mouth. Burning pain in mouth and stomach, which comes on immediately, vomiting, great shock, collapse, and signs of suffocation.

Treatment.—For the mineral acids, give two teaspoonfuls of washing soda in a tumbler of water. Failing washing soda, chalk, magnesia or wall-plaster—a tablespoonful to a tumbler of water—may be used. Follow with olive oil, salad oil, cod-liver oil, white of egg, milk, or thick gruel.

The Alkalies.—Give lemon-juice or vinegar in an equal quantity of water. Follow with an oil or other demulcent drink.

Strong Carbolic Acid.—Give alcohol freely, or ½ ounce of Epsom-salts in a tumbler of water. Follow with an oil.

Oxalic Acid.—Give chalk or lime-water. Avoid giving soda, potash, or ammonia. Follow freely with stimulants, demulcent drinks, and a full dose of castor oil.

2. **Irritant Poisons** cause irritation of the stomach and intestines. The chief examples are: ptomaines, corrosive sublimate and the other salts of mercury, arsenic, phosphorus.

Symptoms.—A sensation of burning, which gradually increases to pain. Vomiting and diarrhœa, followed by shock.

General Treatment.—Give an emetic and water. Administer the antidote for the particular poison used. Follow with oil,

melted butter, milk, or white of egg. Treat the accompanying shock, and prepare for washing out the stomach.

Ptomaines are contained in poisonous meat and fish. Give castor oil, brandy, and hot coffee.

Mercurial Salts.—Give large quantities of white of egg, with milk, water, or flour and water. Administer an emetic and stimulate freely.

Arsenic is contained in certain weed-killers. Give an emetic and water in large quantity, or olive oil (1 in 3 parts of water). Iron, magnesia, and animal charcoal are antidotes. Follow with stimulants and castor oil.

Phosphorus is contained in matches and rat-pastes. Give an emetic, and follow with ½ ounce of Epsom-salts, milk, and eggs. Avoid anything of an oily nature.

3. **Convulsant Poisons.**—These cause convulsions along with other symptoms.

Examples: Yew and Laburnum, Strychnine, Hydrocyanic Acid.

Yew and Laburnum produce the symptoms of an irritant poison with the addition of convulsions.

Give an emetic (unless much vomiting has occurred already), castor oil, a bland oil, such as olive, and stimulate freely.

Strychnine may be contained in rat poisons.

Symptoms.—Lividity of face, convulsions, staring eyeballs, and a feeling of suffocation.

Treatment.—Give an emetic. Follow with bromide of potassium, 2 drachms in 2 ounces of water, or give alcohol in large quantity both by stomach and rectum.

Hydrocyanic Acid is also called Prussic Acid. It is the most rapid poison known.

Symptoms.—Within a few seconds giddiness and collapse occur. There may be convulsions. The breath has an odour of bitter almonds. Panting respiration and insensibility, with fixed, dilated pupils, rapidly ensue.

Treatment must be immediate if any good is to be derived from it. Give an emetic. Perform artificial respiration. Give inhalations of ammonia or oxygen, and stimulate freely with alcohol.

4. **Narcotic Poisons.**—The principal effects of these are drowsiness and insensibility.

Examples: Opium and Morphine, Belladonna and Atropine, and all sedative drugs.

Opium and Morphine cause a gradually deepening unconsciousness passing into stupor, coma with stertor, and death. The pupils are contracted.

Treatment.—Give an emetic. Keep the patient roused to prevent him from sleeping. Administer enemata of hot coffee and stimulants. Apply warmth, perform artificial respiration, and prepare to wash out the stomach.

Belladonna and Atropine cause dryness of the throat and skin. The pupils are widely dilated and the temperature is raised. Respiration becomes slow. Delirium follows.

Treatment.—Give an emetic. Administer stimulants and hot coffee. Morphine is an antidote; it may be given subcutaneously. Apply warmth, perform artificial respiration, and send for the stomach-tube.

5. **Gas Poisoning.**—Certain gases are poisons. Amongst these are coal gas, acetylene, sewer gas, carbon monoxide, and chlorine.

Symptoms.—Giddiness, lividity of face, rapid and forcible action of heart. Convulsions and coma. Cessation of breathing.

Treatment.—This for coal gas, acetylene, sewer gas, and carbon monoxide is practically the same. First, the patient must have fresh air. Proceed with artificial respiration. Administer oxygen. Keep the body warm and give stimulants.

Chlorine and other Irritant Gases.—*Symptoms.*—Pain in the eyes, throat, and chest. Choking sensation; the patient coughs and gasps. Vomiting may occur, and, as a rule, it produces some relief. Loss of consciousness follows, with persistence of cyanosis.

Treatment.—Soak a cloth with alcohol and use it as an inhalant. Ammonia or a 10 per cent. solution of bicarbonate of soda may be used in the same manner. Give alcohol internally and inhalations of oxygen. Emetics have been recommended for severe cases. Half a pint of salt and water followed by a large draught of lukewarm water may be given to induce the vomiting.

REMOVAL OF FOREIGN BODIES.

From the Air-Passages.—Send for the doctor. Invert the patient, and clap him on the back. Treat as for choking.

From the Eye.—Let the patient be seated. Stand in front of him. Evert the lower lid, and wipe with a piece of soft linen

that has been dipped in warm water. To evert the upper lid, a match may be placed across the outside of it and held there. Then, by gently seizing the eyelashes, pull the lid upwards. It may be helpful to ask the patient to look downwards during the process. When the inner lining is exposed, wipe as above. Should the foreign body be a piece of lime, pour olive or castor oil upon it and then wipe it away very gently.

From the Ear.—Nothing should be done beyond pouring half a teaspoonful of oil into the orifice, while the patient lies on the sound side. Never attempt to poke at the foreign body.

From the Nose.—The nose may be gently syringed with warm water.

From the Intestines.—Should a pointed foreign body be swallowed, a large meal of potatoes, bread-and-milk, or porridge may be given. Do not give a purgative.

FRACTURES.

A fracture is the name given to a broken bone. It may be broken at the spot where the injury is applied (fracture by direct violence), or at some distance from it (fracture by indirect violence). The sudden contraction of a muscle is sometimes responsible for the accident (fracture by muscular action). Occasionally disease of the bone may be the chief cause. It is then known as a spontaneous fracture.

In advanced age, and in some forms of disease, especially such types of mental disease as epilepsy and general paralysis, the bones are often exceedingly brittle, and great care is needed in nursing, to avoid the risk of a fracture. This is all the more necessary, because it is almost impossible to convince the relatives of patients that a fracture may not be the result of great physical violence. Moreover, the patient whose bones are most brittle has little recuperative power, and in his case a fracture often means that the limb will be more or less useless in future.

A fracture is said to be **simple** when there is not a wound in the skin or mucous membrane which would permit the entrance of air to the injured bone, and **compound** when there is such a wound.

The latter condition will allow the entrance of micro-organisms, which may start inflammation—a very serious condition in a fracture, as it may then become necessary to amputate the limb in order to save the patient's life. Any injudicious handling or movement of the broken bone may push one of the broken ends through the skin, thus converting a simple into a compound fracture.

If a bone is broken in several places it is called a **comminuted** fracture. Should it be accompanied by injury to large blood-vessels, nerves, etc., it is said to be **complicated.** Where one end is driven into the other it is **impacted.** In the case of the skull bones one fragment may be driven below the surface. This is called a **depressed** fracture. Where a bone is incompletely broken across it is a **greenstick** fracture. This is liable to occur in children.

The ordinary signs of a fracture are: *Pain, swelling, deformity, loss of power, irregularity, shortening* in the case of long bones, *unnatural mobility* (except with impaction), and *crepitus,* or grating of the broken ends together, which is not present in impaction or if the broken ends are much displaced.

In the treatment of a fracture it is necessary to bring the ends of the broken bone into their original position or to do this as nearly as possible. Any intervening space becomes filled with a material called callus, which eventually turns into bone. The necessity for absolute rest in the early stages of a fracture will therefore be seen. This condition may be secured by the application of splints or plaster of Paris.

Immediate Treatment.—The first necessity is the prevention of further injury. As already stated, a simple fracture may be converted into a compound fracture by injudicious movement or handling of the limb. Therefore the following points should be observed:

Keep the patient at rest as completely as possible.

Handle the limb with the utmost gentleness, and only when absolutely necessary.

Having satisfied yourself by examination that a fracture exists, secure splints suitable for the limb concerned. When these are ready they should be applied, a task requiring two people, who hold the limb both above and below the fracture, and use such gentle extension as may be necessary to get the bones into their

natural position. This may be done over the clothes. The position should be maintained by means of splints—two are generally necessary, one for each side. They can be kept in place with a bandage, strap, or tape, care being taken to make any knots directly over the splint and not over the unguarded limb.

A certain amount of shock accompanies every fracture, and so it will be necessary to keep the patient warm by suitable clothing and hot drinks.

When dealing with a compound fracture, the wound in the skin should be covered with a clean piece of linen or calico, which, if possible, should be soaked in a disinfectant prior to using it. The fracture may then be treated on the same lines as in the case of a simple fracture.

Emergency Splints.—There are many kinds of splints. Unfortunately those of most use may not be immediately available. For first-aid work, however, any material sufficiently hard may be utilised. Pieces of wood, hoop-iron, strong cardboard, folded newspapers, will be found useful. Should the accident occur in the street, a sling can be applied in the case of an upper limb. In the lower limb an umbrella, stick, or broom-handle may be used as a splint, and the two limbs tied together for further support. The patient can then be carefully placed upon a stretcher for removal to bed.

All splints should be padded with some soft material, such as wool. If this is not available, a substitute may be adopted by folding a piece of flannel or other material several times to get a pad of sufficient thickness. As a general rule the splints should extend above and below the nearest joints, to secure proper rest. In applying them care must be taken to avoid uncomfortable pressure upon any part. This may be prevented by means of the padding, which should be secured to the splint prior to its application to the limb.

After the application of a splint, it is necessary at intervals to watch the toes or fingers of the limb concerned in case they should become blue in colour—an indication that the splint is too tight and requires loosening.

When the lower limb is affected, much comfort may be obtained by the use of a cradle, which has the double advantage of keeping the bedclothes away from the broken limb, and of elevating it, should this become necessary.

As a further security against movement, sandbags may be placed along the limb upon each side.

The bed may be kept from sinking in the middle by placing several boards (fracture boards) crosswise under the mattress. Should there be any difficulty in removing the patient's clothes, the nurse need not hesitate about cutting them with scissors, which should be done along the seams.

Fracture of the Clavicle usually occurs as a result of a fall upon the hand or elbow. Frequently the patient is seen to support the elbow of the injured side, and the broken ends may be felt by running a finger gently along the skin over the bone.

Treatment.—It is necessary to raise the shoulder and lever it outwards. This may be done by means of two towels and a pad. The pad, which should be a couple of inches thick, is placed in the armpit to aid the leverage of the shoulder outwards. One towel, in the form of a sling, raises and brings forward the elbow, while the other binds the arm to the side.

Fracture of the Humerus may be caused by a fall upon the arm, hand, or elbow.

Treatment.—Three short, narrow splints may be applied, one on the inside, extending from the armpit to just above the elbow, the other two on the front and back of the arm. They must permit the forearm to be bent at right angles to the arm, which should be allowed to hang straight down from the shoulder, and may then be secured to the side with a binder, leaving the forearm free. The hand should be put in a sling.

Fracture at the Elbow-Joint will require the use of an L-shaped splint, which may be made by attaching one splint to another with a piece of tape or bandage. It should then be applied upon the inside of the limb, care being taken to pad the splint to avoid discomfort from the upper end in the armpit.

Fracture of Both Bones of the Forearm.—In this condition the four ends are liable to be drawn inwards towards one another. It is important that the splints should be slightly broader than the forearm, and so prevent the pressure of the bandage upon the sides of the bones. A hollow may be cut in the front splint for the ball of the thumb. A large sling should support the elbow and forearm.

Fracture of the Radius.—The usual fracture associated with this bone occurs at its lower end, and is known by the name of Colles's fracture (Figs. 75 and 76). It generally results, in

the case of an elderly person, from a fall upon the outstretched hand. Impaction is common. A prominence appears at the back of the wrist, and the hand is pushed over to the radial side.

Treatment.—For first-aid purposes it will be sufficient to apply splints similar to those for fracture of both bones, except that they should not be wider than the forearm. The fingers should be left free, and movement of them encouraged to prevent stiffness.

FIG. 75.—COLLES'S FRACTURE: LATERAL VIEW.

FIG. 76.—COLLES'S FRACTURE: PALMAR VIEW.

Fracture of the Ribs usually affects the middle four. The broken ends may perforate the pleura and lung, causing spitting of blood (hæmoptysis), or the hæmorrhage may take place between the layers of the pleura (hæmothorax).

Symptoms.—The side feels tender, and there is pain on deep inspiration or on coughing. Crepitus may sometimes be felt.

Treatment.—Temporary relief may be obtained by the application of a broad binder. The patient should be placed in the semi-recumbent position as early as possible.

Fracture of the Neck of the Femur.—This is especially common in elderly people, and it may result from very slight violence—direct or indirect—to the part. At first there may not be any apparent shortening, but the leg lies more or less helpless, and the toes point outwards. There is considerable pain. Crepitus should not be looked for, because the fracture is often impacted.

Treatment.—Place the patient in bed, in a semi-recumbent position, and with a couple of pillows under the knees.

Fracture of the Shaft of the Femur.—This is most likely to occur just above the centre of the bone. There is generally considerable shortening, owing to the action of powerful muscles.

Immediate Treatment.—Obtain a long, narrow splint, or broom-handle, sufficient to extend from the armpit to below the ankle,

and a short one, to extend from the groin to below the knee. Secure the long splint to the body by two bandages tied around the armpits and hips; secure it to the ankle, and then proceed to apply the inner splint with bandages, embracing both splints above and below the seat of fracture. Finally, bandage the long splint to the calf of the leg. After the completion of the splints, secure the fractured limb to the sound one before moving the patient.

Fracture of the Patella frequently results from muscular action. If the fracture be transverse, a considerable space may be felt between the fragments.

Treatment.—Place a long splint behind the limb, extending from the buttocks to beyond the heel. Bandage the whole limb to it, and elevate the lower end by placing it upon a doubled pillow.

Fracture of Tibia and Fibula.—In most cases both bones are broken, but a single fracture of the lower end of the fibula, known as Pott's fracture, is fairly common. In fractures of both bones, the tibia frequently protrudes through the skin, or a sharp end may be lying just beneath the skin, therefore great care is needed.

Treatment.—Put the limb up in two side splints, reaching from above the knee to below the foot, and secure it to the sound one for the removal of the patient. If the fracture be compound, cover the wound with an antiseptic dressing.

Fractures about the Ankle-Joint include Pott's fracture and those of the small bones of the foot.

Immediate Treatment.—Place the foot in as good a position as possible, and apply two side splints resembling those for a fractured tibia.

DISLOCATION.

A dislocation is the displacement of one or more bones at a joint. The chief symptoms are: pain, swelling, deformity, unnatural position of the limb, and loss of movement of the joint.

Dislocations usually follow injury, but they have been known to result from disease of the joint. They are called congenital when they exist from birth. A common example of this occurs at the hip. Like fractures, they may be simple, compound, or complicated.

The dislocation of a joint is liable to be followed by stiffness. Recurrences of the displacement are common. The joints most

frequently concerned are those that are most movable, the shoulder being affected more frequently than all the other joints put together. The cause of this dislocation is generally a fall upon the hand or elbow.

Treatment.—The nurse must confine himself to making the patient as comfortable as possible. No attempt at reduction of the displacement should be made. Medical aid should be summoned.

SPRAINS.

A sprain is the stretching or tearing of the ligaments around a joint.

Pain and swelling are its chief symptoms, and the wrist, ankle, and knee are most commonly affected. It may be combined with a fracture, and it may not be possible to distinguish between the two without the use of the X rays.

Treatment.—A bandage should be applied firmly around the joint until the patient can be placed in bed, when hot *stupes* (see p. 202) and rest may bring relief. Rest can be rendered more complete by raising the limb in a cradle or allowing it to lie between sandbags.

SECTION IV

HYGIENE

HYGIENE is really only another word for "health," but the term is generally used to denote all that pertains to the preservation of health, and, what is practically the same thing, the prevention of disease.

Some people possess greater powers of resistance than others, can withstand fatigue, privation, neglect, and exposure better, and are less liable to succumb to infections; but every individual can do much to promote his own bodily and mental health by following certain important rules. The care and preservation of health should be regarded as a personal duty by every member of a community; and even more is it a bounden duty for every man or woman engaged in the healing and nursing arts to pay strict regard to the observances of sanitary and hygienic measures, and to train all patients to do the same.

Amongst the most important factors in the preservation of health are a proper supply of wholesome food and good water, fresh air, sunlight, protection from the weather, cleanliness, regular and temperate habits, and regular employment. Where numbers of people are living close together in communities, further sanitary measures become necessary for the public welfare. These include a proper system for the removal and disposal of sewage (dirt and excreta); the prevention of overcrowding; official supervision and inspection of water and food supplies, to prevent the conveyance of infection by them; the avoidance of infectious diseases, and the provision of special hospitals for isolating and disinfecting those suffering from them.

It has been found that in a healthy person the body temperature is always about 98·4° F. or 36·9° C. (nearly all temperature charts show Fahrenheit degrees marked down the left-hand side and centigrade equivalents down the right-hand side). This is called the normal temperature.

Whether a man be asleep or awake, digesting or fasting,

exercising or in repose, so long as he is in good health his temperature varies very little indeed.

One principal reason for this is the regulating action of the skin and sweat glands. Though, in a healthy person, the body temperature is not affected to any marked extent by the temperature of the surrounding air, yet in certain circumstances, under exposure to extreme cold, heat can be lost by the lungs and skin faster than it is produced. To go about insufficiently clad in cold weather is always imprudent, unless one is particularly hardy, and we often speak of becoming " chilled " or " catching cold."

On the other hand, if we take violent exercise while too heavily clad we speak of becoming " overheated." For example, a soldier, marching on a hot day, burdened with a heavy pack and various accoutrements, soon feels oppressively hot, streams with perspiration, and begins to pant instead of breathing comfortably and easily. If, however, he loosens the belt and slings of his equipment, and throws open his tunic and shirt, the evaporation from his skin gets freer play, and he can march with greater ease and comfort. He then feels cooler and actually is cooler. The body temperature may rise and fall fully half a degree in such circumstances.

Weight is an excellent index to the bodily health and a valuable means of ascertaining the condition of patients in mental hospitals. Its importance is shown by the fact that a certain standard of weight in proportion to height is recognised by insurance companies as normal and healthy; but there are variations, according to the particular constitution of the individual. Some people are spare and wiry, and quite as healthy as others who are built on broader, bulkier lines; so too much value must not be attached to these mechanical standards. It is of more importance to observe changes which occur in the weight of the same individual. Here it will be found that a person may vary several pounds in a year, losing and gaining by turns, without any serious impairment of health, but a marked progressive loss of weight as a rule indicates the onset of some serious insidious bodily illness.

Weight shows how the nourishment of the body is being maintained, and enables us to say whether wear and tear are in excess of, or are being met by, the digestion and assimilation of new material.

WASTE AND REPAIR.

The body tissues are being constantly used up by our energies and activities, and just as constantly being renewed by the materials derived from the digestion and assimilation of food. The process of waste and repair going on in a man's body is rather like a bank account of loss and gain. The more a man takes out of himself the less he has to spare, and the more he requires to make up.

Every organ must have a reasonable amount of exercise to keep it in healthy working order, and the waste and repair should balance each other. Fortunately, a healthy man has a good reserve fund of tissue-substance and vitality, but if his account is overdrawn by over-exertion, by continued lack of rest, by deprivation of necessary nourishment, or by severe illness, the wastage has to be made good again by additional nourishment and additional rest till the normal healthy balance is restored.

DAY-ROOMS, DORMITORIES, SICK-ROOMS.

Comfort, cleanliness, pure air, and freedom from damp are of the greatest importance in all dwelling-places.

In hygienically arranged habitations, whether dwelling-houses or hospitals, the day-rooms or living-rooms should be separate from the dormitories or sleeping quarters. It is very desirable, especially where there are many people, as in a hospital, that all meals should be taken in a dining-room which is set apart for that special purpose.

We should always look upon the ward as the home of the patients, and try to make it a healthy and congenial dwelling-place for them. Day-rooms should be bright and attractive, and sunlight and fresh air should be freely admitted. The amount of furniture should not exceed what is necessary to secure efficiency and comfort, and, as far as possible, it should not be cumbrous or bulky. Excessive furniture tends to harbour dust, and heavy furniture is difficult to move for cleaning purposes. Plants and fresh flowers are beneficial as well as decorative, and no ward should be without them. They should be tastefully arranged and carefully tended. Plants require to be watered regularly, but care must be taken not to overdo it, as

careless drenching may ruin them. Stale cut-flowers are injurious to health and must always be thrown out.

The ideal day-room is one on the ground level, on the sunny side of a building, opening directly on a lawn or garden, so that the patients can get out easily and quickly into the fresh air when taking exercise.

Dormitories should be kept cool, airy, and quiet, and the light subdued, everything being managed with a view to promoting sound, healthy, and restful sleep. As a rule, upstairs rooms make the best sleeping quarters.

In sick-rooms, where patients are congregated day and night, suffering from a variety of bodily disorders, it is especially important to observe scrupulously and unceasingly all the rules of hygiene.

VENTILATION AND WARMING.

The composition of the air and the functions of respiration have already been described in Section II. Too much emphasis can never be laid on the fact that fresh air—that is to say, pure air—is essential to the preservation of good bodily health. The air in rooms and confined spaces occupied by human beings or by animals quickly loses a certain amount of oxygen, and suffers a proportionate increase in the amount of carbonic acid gas. It also becomes fouled by suspended matters such as dust, decomposing epithelium, sweat, excessive moisture, and multitudes of bacteria, some harmful and some not. The air in rooms therefore requires constant changing. Thus arises the problem of **ventilation,** the object of which is to maintain indoors a constant supply of fresh, pure air and to remove foul air. The subject of ventilation is thus closely connected with other problems, especially the regulation of temperature, and methods of heating, lighting, and cleaning.

There are many forms of ventilating apparatus, but the more modern tendency is to discard these special devices as much as possible and to rely largely upon natural ventilation, by open windows at opposite sides of the room or ward, combined with some method of warming.

Natural ventilation (effected without the use of special apparatus) takes place chiefly (*a*) by diffusion, the gases of the

air tending to mingle quickly in all directions; (*b*) by winds, acting either by blowing through (perflation) or by suction. The suction produced by the wind as it blows past a chimney or open window draws air after it, and so causes a good deal of draught up a chimney, and also enables the nurse to close the windward windows of a ward and leave the leeward windows open, so that the foul air is drawn out; (*c*) by differences of temperature. Warm air tends to rise and escape from the upper part of a room, while cold air flows in below to take its place. It is because of the colder currents of air, commonly called "draughts," on the floor, that cats and dogs prefer to lie on sofas and chairs. The rate of interchange between outside and inside air varies with the weather and with differences of temperature and dryness. On bright cold days rooms can be kept fresh with few windows open, while on damp, muggy days this is difficult with all open. The carbonic acid gas diffuses away easily enough, but the organic matter clings about on damp surfaces. The air of rooms becomes offensive when the carbonic acid gas reaches 0·06 per cent., and to keep it down to the normal 0·04 per cent. each person requires 3,000 cubic feet of fresh air per hour. It must be noted that although the amount of carbonic acid gas is used as the standard for testing the purity of the air, the real harm is done by the diminution of the oxygen and by the presence of organic particles. These can be detected by the smell when one comes in from the fresh air, but the nose loses its delicacy of perception when one has been in a room a short time and is no longer a reliable guide. In a properly ventilated institution there should be no "smell of humanity." The larger the room or ward, the better is the diffusion of air and the less does one feel the draughts of incoming fresh air. In calculating ventilation requirements, each person in the room should be allowed from 300 to 600 cubic feet, according to the living conditions. As no height above 10 feet from the floor counts towards fresh air, this means that from 30 to 60 square feet of floor-space must be allowed. A very high ceiling, unless there is a proper roof ventilator, tends to cool the fouled and heated air and so to make it come down and mix again with the air of the room; it is thus very important in lofty rooms to reckon by floor-space irrespective of height. In mental hospitals the Board of Control of England requires 40 square feet of day-room and 50 square feet of dormitory floor-space per person and

63 square feet for single rooms, together with one-third more than these amounts for infirmaries and sick-rooms.

One of the many difficulties that beset the conscientious nurse is, that, owing to ignorance of the principles of ventilation, very many people have a strong objection to open windows and fresh air. They believe it causes draughts and chills; but properly managed ventilation should produce no unpleasant draughts, and nothing is so productive of so-called "colds" as a stuffy and ill-ventilated atmosphere.

The usual methods of **heating** in mental hospitals and other large institutions are: (*a*) Hot water in pipes, flowing from the boiler house; (*b*) the same pumped round under pressure; (*c*) steam driven through pipes; (*d*) water circulating in each block, warmed by a calorifier in the basement supplied by steam from the central boilers; (*e*) electric radiators; (*f*) exhaust steam from the engine-room drawn through pipes and then pumped into the boiler feed, an economical plan generally known as the "Vacuum" steam method; (*g*) a special system, in use in some institutions and other large buildings, known as the "Plenum" system, which combines ventilation and heat regulation. Purified air is driven by means of revolving fans into special inlets, where it is warmed by passing over hot pipes, or may in hot weather be cooled by a cold water spray, and is then distributed all over the building by air pipes leading it into various wards and rooms.

Whatever method is used, the best radiator pipes are those placed in the currents of fresh air coming into the room, whether by windows or special air inlets. Covers over the radiators help to distribute the warmth and also to protect patients from burns. The most efficient way mechanically is to have these covers closed below and open above, but that allows them to be fouled by dust and débris and by patients leaning over them and spitting or coughing into them. In this way they may become hotbeds of phthisis and other infections. Various devices have been resorted to on this account, such as glass-walled cupboards with the hot-air outlets above the level of the patients' heads, and capable of being opened and cleaned at intervals. The disadvantage of these is that hot air ascends, and should, therefore, be admitted as low down as possible into the room.

Radiators tend to heat and dry the air too much, and are not

so pleasant as open fires, which heat the walls and the furniture, and also help ventilation by the updraught in the chimney. Fires, however, are very wasteful, as a large part of the heat goes up the chimney and is lost, though there are a great many modern improvements in fire-places devised to make them throw out a much larger amount of heat than those with the old wide chimneys. Fires also use up oxygen in the air rapidly, every pound of coal using about 300 cubic feet of air.

The temperature in day-wards should be between 50° and 55° F., and in infirmaries and sick-rooms between 58° F. and 62° F. Dormitories, on the other hand, should be distinctly cooler, from 45° F. to 50° F.

The nurse should note the temperature of the room at intervals, and attend to whatever affects the ventilation. Points to observe are that the ventilators are clean, and not obstructed in any way; that the chimneys are not blocked by soot, by rubbish pushed in from below, or by birds' nests above; that no dirt and dust accumulate; and that all soiled linen is at once taken outside. The force and direction of the wind, and the variations of outside temperature, should be noted and a decision be made accordingly as to how many and which windows to open or close. Opening the windows at the top causes a less unpleasant draught than opening them at the bottom. Whenever the patients are out of the wards all the windows and as many doors as possible should be left wide open to give a free circulation of fresh air. Sunshine should enter as freely as possible, but should not be allowed to stream on the faces of those in bed. All dormitory windows should be open all night, except in unusually severe or stormy weather, for people warmly covered up in bed do not feel the cold, quickly become inured to draughts, and sleep much better with free air blowing in. The ventilation of dormitories needs a great deal of watching, as many patients have a habit of closing windows again at the first opportunity

There are many forms of artificial **lighting**—by candles, lamps, ordinary coal gas, acetylene gas, and other gases; but electric light has to a large extent displaced all other methods in hospitals, public institutions, and modern dwellings. The burning of lamp oil, coal gas, or similar flame illuminants in a room consumes much oxygen, and produces additional carbonic acid gas. One gas burner, for instance, has been reckoned to use up as much

air as two or three persons. Electric light has not this effect. Where gas is still employed for illumination it is sometimes made to assist in ventilation by placing an air outlet in the wall or ceiling above the burner. The air heated by the flame rises and escapes, and fresh air is drawn into the room, through the windows and door crevices, to replace it. This explains why there are often a number of perforations in the ceiling round the top of the gasolier.

At night no more artificial light should be used than is necessary for proper nursing and supervision, and lights should be screened as much as possible to prevent the glare from falling directly into patients' eyes.

CLEANSING.

The cleanliness of every part of a building should be most scrupulously observed. No hole or corner, no cupboard or shelf, should be allowed to harbour rubbish or dust. All dust-collecting surfaces, such as ledges, brackets, the tops of doors and window casings, cornices, mantelpieces, and furniture tops should be dusted every morning. The dusting should be done with damp cloths, rinsed from time to time in warm water. Dry dusting only blows the dust about, and is rather worse than useless. Dusting should never be done just before a meal in any room where food is eaten.

Carpets should be swept with damp brooms, or first sprinkled with damp tea-leaves to keep down the dust. At regular periods all carpets, rugs, curtains, and hangings should be thoroughly shaken and beaten in the open air, though the use of some modern vacuum cleaners is held to be a more effective method. These machines draw the dust into receptacles by means of powerful suction, which is much more satisfactory than the older methods which scattered the dust in the air.

A polished floor surface is the most easily kept clean and absorbs the least dirt, and in institutions the floors are nearly always kept well polished by a dressing of wax and turpentine or a similar preparation. Floors in daily use should be dusted and polished every day. Polished floors require occasional scrubbing, but this should not be too frequent, and when scrubbing care should be taken not to use more water than is really necessary, as it tends to soak into the wood, spoiling the surface

and making it more liable to harbour dirt. The floor should be well polished again as soon as it is dry.

Anything wet on a floor or table should always be quickly wiped up, and no damp should be allowed to gather on walls or other places. Walls should be brushed down at least once a week, and from time to time ceilings should be treated similarly.

Flies and Insect Pests.—In connection with cleanliness it cannot be too strongly emphasised that much disease is spread by insects. It is well known that malaria is carried from one person to another by a certain type of mosquito, plague by certain fleas, typhus by bugs and lice, and "trench fever" by lice. The common house-fly and the bluebottle are among the very worst offenders in this respect. The fly that is buzzing round the dinner-table, settling on the meat or the jam, and perhaps finally falling into the milk jug, may have come direct from a manure heap or other refuse, and so may contaminate food and spread infection. The flies hovering about the grocer's window, sampling everything in turn, may just have visited an open sink or cesspool. Incessant warfare should therefore be waged on flies and vermin. All foodstuffs should be protected from them. Stale food, decomposing garbage, and dirt always attract flies, and should be immediately disposed of and placed in covered receptacles or a sanitary dustbin. Be specially careful to keep lavatories and latrines clear of flies. Their activities are associated particularly with the spread of enteric fever.

Fleas and **bugs** are only occasional visitors to the human body, and a change of clothing and the use of a little insect powder will generally suffice to get rid of them.

Fleas inhabit and breed in the fur of domestic animals and their bedding. Fleas from infected rats may convey to man the bubonic plague. Rats are conveyed from one country to another in the holds of ships, and thus epidemics may become world-wide. Bugs hide themselves and breed in the crevices of old wall-paper and plaster and woodwork and in the seams of mattresses. They may convey the germ of typhus.

Moths.—The clothes moth in the maggot stage is destructive to furs and woollen materials. The eggs are laid on the material by the winged insect, and when these hatch out the maggots quickly destroy the material by eating holes in it. Clothes which are put away in stores and cupboards should be taken out and shaken and brushed from time to time, and if small lumps of

camphor or naphthalene are placed among them it will help to keep the moths away.

Rats and **mice** may be attracted to a ward by any odds and ends of food left lying about; on the other hand, they soon desert a place where they cannot find any food. Rats have been known to eat their way at night into the clothing of patients who had stowed away food in their pockets. These vermin nearly always have parasites of their own which may convey infection to human beings. Their presence should always be reported and a strenuous campaign waged against them.

Spitting.—Promiscuous spitting is not only a dirty and offensive habit, but it may spread disease. For instance, the expectoration of a phthisical patient contains countless germs of tuberculosis. When the sputum dries these germs become scattered broadcast in the floating dust, and may be inhaled by other persons. Sputum cups should therefore be provided for all such patients, and there should be spittoons for the use of all tobacco chewers and those who cannot be trained to refrain from spitting. These receptacles should be frequently emptied and cleaned, and no person should be allowed to spit on the floor or behind furniture and radiators.

OPEN-AIR LIFE.

The purest air is found in the open country, away from crowded communities and factories, which use up much of the oxygen and send forth smoke, dust, and fumes. A condensed form of oxygen, called " ozone," is present in minute quantities in pure air, and is found to be more abundant in the uplands and by the sea. The value of sea air and mountain air is proverbial, but in a flat country one may obtain considerable benefit by ascending comparatively low hills.

In sheltered valleys the atmosphere is not so invigorating, but healthy vegetation helps to purify it. In damp, low-lying and marshy regions, especially in hot countries, there is generally an excess of carbonic acid and other gases resulting from the decay of rank vegetable matter; and insects, many of which convey infection, are much more abundant. The most notable example of this is malaria, which is carried by the mosquito.

The healthiest mode of life is that spent in the open air and, broadly speaking, the most robust people are those who live

and work at sea or in the mountains, the high-lying moors and downs.

Active outdoor exercise in all weathers hardens the muscles, increases the appetite, improves the circulation, promotes deeper and fuller breathing, and stimulates the glandular secretions of the body. Exposure to sunlight, which is an active enemy of disease, is very beneficial, while habitual exposure to wind and rain keeps the skin healthy and clear, and inures the body against cold.

The country dweller generally leads a less artificial and harassing life than the dweller in the city: his diet is usually simpler, and as a rule he keeps earlier hours. All these factors reduce the drain on his bodily resources.

Merely working or exercising in the open air by day is not sufficient. Pure air must also be breathed at night. In too many rural dwellings the benefits of the day in the open air are largely destroyed by spending the evening in stuffy rooms and sleeping at night in close, badly ventilated quarters. The worst form of these evils is the " box bed," where ventilation cannot be said to exist, and the sleeper is soon breathing in diminished oxygen and increased carbonic acid gas, and the organic impurities given off by his own lungs.

The great prevalence of tuberculosis in certain rural regions is almost wholly due to bad ventilation and to dampness in the dwellings, especially the sleeping quarters. It also spreads among cattle which are kept in dark, stuffy, and insanitary byres (shippons).

A valuable lesson in the benefits to be derived from an open-air life was obtained during the four and a half years of the Great European War. Thousands of men showed a very great improvement in general health, weight, and bodily strength during their period of training, which was mostly spent in hard, muscular work and physical exercises in the open air.

REST AND EXERCISE.

Every creature requires intervals of rest and tranquillity to allow the tissues to make good the wastage that occurs during the periods of activity. Sleep is the most complete form of rest, and has been well described as a " closing for repairs." Repair of tissue is going on all the time, but while we are

awake and active it is outstripped by the expenditure of energy, and after a time the supply falls short of the demand. Thus when night comes the body needs to recoup itself in readiness for the activities of the next day. During sleep the circulation is less rapid and all the vital functions are slowed down, while the conscious activity of the mind ceases. The natural time for sleep is during the hours of darkness, and every man and woman should have from six to eight hours of sleep, though the amount needed differs greatly according to age, temperament, occupation, and habit. Children need more, and old people, whose bodily activities are diminished, need less.

Sleeping in the open air is so much more invigorating and beneficial than sleeping indoors that one actually requires less of it.

The question of rest is closely related to that of exercise. The term " exercise " is generally used in the restricted sense of action of the voluntary muscles. It is a necessity if health is to be preserved, but the greatest personal differences exist in regard to the amount required, and also in the conditions in which different amounts are desirable. One of the most important results produced by active exercise is an increase in the rate and depth of breathing, which promotes the absorption of oxygen and the elimination of carbonic acid gas. For instance, this interchange is increased five times by walking at four miles an hour, and at least seven times by running. If exercise is too severe the breathing soon becomes embarrassed, but it grows easier once more when the " second wind," due to compensatory changes in the systemic bloodvessels, is gained. The action of the skin is greatly increased by exercise, and free sweating occurs, raising the amount of water, salts, and fatty acids excreted. By regular and suitable exercise the muscles grow larger and firmer, and the intramuscular fat is absorbed. But there is a limit, and if exertion be too prolonged or too severe, degeneration of the muscle fibres may follow (" staleness ").

The appetite is stimulated by exercise, and there is a call for more food, resulting from the increased oxidation. But exercise should be carefully graduated according to the strength of the individual. A gentle stroll for half an hour may be quite enough for a frail, elderly person, while a strong young man requires more strenuous pursuits, and athletics.

Swimming is an ideal form of exercise on account of the wide

range of muscles brought into play. For most people walking is the exercise most easily indulged in, and it has one great merit, that it can be regulated both as regards speed and distance according to individual vigour.

Deficiency of exercise generally leads to torpidity and indolence, headaches, dyspepsia, constipation, fatty degeneration of the muscles, and general obesity.

Employment both of body and of mind is very necessary to perfect health and has a great bearing on happiness. A congenial occupation does more than anything else to preserve a man from becoming slack and morbid; contentment and industry are great factors in promoting health. The nature of a person's occupation generally determines to some extent the amount of rest and type of exercise required. All people engaged in sedentary work ought to take regular outdoor pedestrian exercise. The best recreation and exercise are to be found in open-air pursuits and interests, and the health of city children has been vastly improved since better provision has been made for them in our public parks and playing grounds.

WATER SUPPLY.

Water is required for many purposes: drinking, cooking food, the washing of the body, and of clothing, utensils, and houses, the cleansing of sinks, water-closets, sewers, and street surfaces, and the extinguishing of fires. It is therefore most necessary to have a liberal and pure supply. An impure supply may convey diseases, while an insufficient supply leads to the accumulation of filth. The average amount estimated for the needs of a town population varies from 20 to 60 gallons per head per day, but this average includes many persons who practically never bathe and do very little washing. In mental hospitals it is found that an even larger quantity has to be provided for various reasons.

WASHING AND BATHING.

Personal cleanliness is of the highest importance in the preservation of health.

The skin is an organ of excretion, and many impurities are got rid of in the form of sweat. This soaks into the underclothing, which therefore should be changed and washed at least once a week. Much sweat also dries on the skin, and for

this reason, as well as to remove coarse dirt, the body surface should be kept clean by frequent washing and regular bathing. Most people wash the visible parts, the face daily and the hands more often, for the sake of appearance, but the following parts should also be washed every day, because of the sweat which gathers in them: (1) the armpits, (2) between the legs and buttocks, (3) the feet and between the toes, (4) the umbilicus, (5) in stout women the folds beneath the breasts. Attention should also be paid to cleansing the ears and behind the ears, the corners of the eyes, and under the tips of the finger and toe nails. It is a simple but important matter to keep the nails pared and trimmed. The hands should always be washed before eating, to prevent contamination of food by any dirt lodged in the skin. Soap is used to soften and dissolve the organic matter and the surface epithelial cells, but it should always be rinsed off with clean water before drying. Warm water is more effective for washing purposes than cold, but cold water has a stimulating effect. A cold shower bath, cold sponge, or rapid plunge in cold water, followed by a brisk rub with a rough towel every morning is a valuable tonic for active and healthy people, but is risky for those who are not robust. The condition of the teeth and gums is of great importance, and these should be thoroughly cleansed at least once a day. Shreds and particles of food left adhering between and around the teeth begin to decompose and lead to decay of the teeth and inflamed, unhealthy gums. The state of the mouth has a far greater influence on the general health than most people are aware of.

Men should keep the hair of the head short and well brushed; women should comb out the hair thoroughly every day. Vermin are very liable to find a lodging in hair, and this should be carefully guarded against.

DISPOSAL OF REFUSE

The removal and disposal of refuse and dirt, of waste water and sewage, are very important problems in all communities, and the efficiency with which this is attended to has a very vital effect on the public health. All dust, ashes, and rubbish should be removed in covered receptacles, to prevent organisms of putrefaction and disease from blowing about and spreading sickness, and to prevent flies from gaining access. The most hygienic way of disposing of this refuse is by burning it in special furnaces

or destructors. The object of every sewage system is to remove as rapidly and completely as possible all excreta and waste products of the body. In some flat countries the proper removal and disposal of sewage is a very serious difficulty, but where water is freely available and the land is sufficiently sloping to allow of drainage by gravitation (downward fall) it becomes much easier. In this country all modern institutions are equipped with a water-carriage system of sewage. The principal sanitary accessories in this are water-closets and slop sinks, with drain-pipes into which also run the waste-pipes from baths and sinks. The water used to flush out closet fittings and drains is supplied by cisterns separate from those which supply the drinking water, to prevent any possibility of contamination. The sewage thus removed is purified in various ways, and nowadays all large towns have special " sewage farms " for the purpose.

It is of the utmost importance to see that all water-closets are kept scrupulously clean, that they are constantly and thoroughly ventilated, that the pedestals and urinals are flushed directly after use, and the seats and floors immediately washed whenever soiled. Similarly, lavatory basins and baths should always be rinsed out after use.

CLOTHING.

It is believed by most investigators into the habits of primitive races that the earliest motive in donning attire was that of self-adornment, but in civilised races and for all practical purposes we may take it that the principal uses of clothing are for protection from heat, cold, rain and wind, and injury, and the equalisation of body heat. Adornment and show are only of secondary importance and, while a neat and attractive appearance is desirable, utility should be the first consideration. The usual materials used for clothing are wool, cotton, silk, and linen; and, to a less extent, leather, fur, and india-rubber, and their utility in each case depends upon the degree in which they absorb moisture and conduct heat. When some materials are woven into cloth they contain air, which is a bad conductor of heat, between the fibres. Wool contains more air in its fibres than silk or cotton, and therefore keeps us much warmer; it also takes up more moisture and thus removes sweat, which would tend to cool the skin if left to evaporate too freely on it. Hence the value of dry woollen garments after exercise. Many authori-

ties hold that wool should always be worn next the skin, though in hot weather and warm climates only very thin woollen garments would be needed. Linen is coolest, allowing the sweat to pass freely through and evaporate. Silk closely resembles linen in its properties. Garments made of cotton woven in the manner known as "cellular" are much warmer than many people suppose. Soft linen and "cellular" cotton undergarments are very refreshing to wear, are easier to wash than woollens, and can therefore be changed more frequently.

Clean clothing is closely connected with the care of the skin, and all underclothing should be changed and washed at least once a week, in many cases oftener. One great disadvantage of woollen underwear is that it becomes clammy with sweat, and the soft fibre tends to shrink and harden and become less absorbent after frequent washing, while cotton is easier to wash, besides being a cheaper material. Clothing should never fit so tightly as to impede muscular movement; loosely fitting articles of clothing are more comfortable and also warmer as, by retaining a layer of air between them, they act like double walls and keep in the body heat. Black, among colours, absorbs most heat, then come blue, green, red, and yellow, white reflecting most heat and therefore being the coolest. This colour difference applies to the outside layer only, and not to underclothing, though there is a popular belief in the value of red or blue flannel for shirts and vests. As a matter of fact, coloured flannels should never be worn next the skin owing to the possible presence of irritating dyes. Flannelette should be avoided because of its great inflammability, and should on no account be worn by children or by mental patients. The materials and texture of outer garments are of less importance than those of underclothing, but the same general principles hold good, though naturally the occupation of the wearer must be considered. The essential points in all clothing are that it should be (1) adapted to the climate and season, warm enough in winter and cool enough in summer; (2) durable; (3) capable of being washed or otherwise cleansed. All clothing should be kept in good repair, not only for appearance, but also for the sake of the comfort and health of the wearer. Socks and stockings especially should be carefully darned at the first sign of wearing into a hole. Neckwear should allow as much freedom as possible, and the waist should never be tightly constricted, either by corsets or belt. The

weight of clothing should depend whenever practicable from the shoulders, and should be as light as is consistent with due warmth. Tight garters impede the circulation of the lower extremities, and should never be worn; suspenders are more efficient as well as healthier. It is of great importance to have the feet well shod, and for outdoor wear the footgear should as far as possible be waterproof, light, warm, and capable of standing much rough usage. For this purpose leather remains without a rival. Low heels are much better for the feet than high ones, which throw the body forward and make walking more tiring and awkward. Boots and shoes should be roomy, neither too loose nor too tight. When ill-fitting they tend to produce sore feet, flat-foot, corns, and bunions.

Beds and Bedding.—During sleep less body heat is produced; it is therefore important to provide warmth while keeping the bedclothes as light and airy as possible. Soft, fleecy blankets are at once the warmest and lightest coverings. Sheets are necessary to protect the blankets from dirt, and stand washing far better—in fact, blankets should be so carefully looked after that they do not require washing more than twice a year. The outer blanket can be kept clean by a light counterpane. Everything about a bedstead should be clean. Iron bedsteads are less likely to harbour dirt and vermin than wooden ones. The mattress should be firm and even, and should be shaken and turned once or twice a week. On these occasions the bedsprings should be examined. The lower sheet should be smoothed well out and tucked in all round, and the upper sheet and blankets laid evenly and smoothly. It is a very common custom in hospitals to tuck in too much at the foot of the bed, and leave too little at the other end to cover the shoulders and neck properly. It is quite easy to secure neatness in bed-making without interfering in any way with the comfort of the patient, and comfort should be the first consideration in this matter.

Every bed should be thoroughly aired each morning, each article removed separately and spread over the end of the bed or on chairs, the mattress uncovered, and the pillows well shaken up. All doors and windows in a dormitory should be kept wide open during bed-making.

At all times be on the watch for the possibility of vermin in bedclothes, and guard against the tendency of mental patients

to hide food under their pillows and mattresses. Above all, never leave a soiled sheet, blanket, or mattress on a bed, but remove it at once and replace by a clean article.

FOOD SUPPLY.

The functions of food are the building up and repair of the tissues and the production of body heat, and of muscular and nervous energy. A short summary of the various classes of food and the manner in which each is digested has been given in Section II. (pp. 69–76), and the source and dietetic value of each must now be considered.

Proteins.—These bodies exist in complex forms and various combinations in the bulk of animal and vegetable tissues. They all consist of compounds of nitrogen, and are essential to life. Their chief use is the building up and repair of tissues. The foodstuffs which provide our principal supply of proteins or nitrogenous bodies are the flesh of animals, birds, and fishes, eggs, milk, cheese, and leguminous vegetables. Common examples of the various protein groups are: egg albumin, in the white of egg, and serum albumin in blood; globulin, found in blood and egg-yolk; myosin in lean meat; casein in milk, curds, and cheese; legumin in beans, peas, and lentils; and gluten, which is contained in the outer covering of the grains of wheat, barley, and other cereals. Among the many varieties of protein substances are two groups known as peptones and albumoses. Owing to the ease with which they are digested and absorbed they are often given to invalids, in the form of "peptonised" or artificially digested foods, but they do not possess the same nutritive value as the ordinary proteins in our daily diet.

Gelatin is an albuminoid substance (that is to say, a substance resembling albumin), and is obtained largely from bones and cartilage. It swells and dissolves in hot water, is easily digested and absorbed, but by itself has extremely little nutritive value.

Fats undergo a process of oxidation in the body, and are an important source of energy and body heat. The principal animal fats are found in milk, butter, lard, suet, and dripping, and the oils in oily fishes. Vegetable fats include olive oil, linseed oil, palm oil, and oil from various nuts. Margarine is a butter substitute which may be prepared from various fats,

but chiefly from those of beef, mutton, and pork, and a variety of vegetable fats and oils.

Carbohydrates are also a source of energy and heat. They include all the starches and sugars. The starches are found in cereals, wheat, flour, oatmeal, potatoes, rice, sago, tapioca, maize, cornflour, and arrowroot, and they form the main bulk of white bread, macaroni, and vermicelli. Examples of sugars are cane sugar, milk sugar (lactose), malt sugar (maltose), various fruit sugars (such as glucose, or grape sugar, and dextrose), and honey.

The two groups, carbohydrates and fats, are to some extent interchangeable. They are both "fuel-foods" and sources of energy and body heat. The starches and sugars are changed by digestion into less complex sugar forms, such as glucose. It has been proved that a man may live in good health for a long time without carbohydrates, and this was done for many months during Nansen's famous Arctic exploration; but it is very doubtful if fats could be dispensed with for so long a time. Proteins, together with excess of fat, will maintain health for a long time without carbohydrates, especially in severe cold and with much exercise. It is believed that a diet rich in proteins and fats protects us to some extent against tuberculosis.

Salts.—A certain amount of these is essential to life. The chief inorganic or mineral essentials are phosphate of lime (for bone), phosphates and chlorides of soda (for body fluids), potash (for muscle and blood cells), magnesia, and the alkaline sulphates and salts of iron. They are derived mainly from vegetables and fresh roast (not boiled) meat.

Many organic salts are essential, such as tartrates, lactates, citrates, and acetates of the alkalies. They come from milk, fresh fruit, and green vegetables. The chief uses of the salts are to harden the bony tissues, to regulate the density of the blood and other body fluids, and to aid in digestion.

Besides the above classes of food, condiments are much used, which vary the flavour and stimulate salivary and gastric secretions; among them are pepper, mustard, ginger, pickles, the essential oils of lemon, vanilla, and various fruits.

Water.—This enters into the structure of all plants and animals; it is present in practically every article of food, and, though not strictly a food, it is a fundamental necessity. A man can go many days without food so long as he gets plenty of water, but

without water he cannot survive more than two or three days. By its means the solid matter in our food is dissolved and conveyed to the tissues, and it assists in washing away all worn-out and waste matter from the system.

DIETARY REQUIREMENTS.

Water forms about 60 per cent. of the body weight, and the daily diet should include from 4 to 5 pints of fluid. Most solid foods contain a considerable proportion of water; for instance: butter about 15 per cent., bread from 35 to 40 per cent., fresh meat from 70 to 75 per cent., milk about 87 per cent. An average person should receive about $\frac{1}{100}$ of his body weight of water-free food daily, and as water forms on an average fully one-half of all solid foodstuffs, a person of 150 pounds weight should consume about three pounds. To maintain physical fitness and energy it is necessary that the various food constituents should be present in proper proportions. Though wide limits are possible, the proportions in a well-ordered dietary should average: proteins 20 per cent., fats 13 per cent., carbohydrates 62 per cent., and salts 5 per cent. Opinions differ as to the relative values of different food materials; vegetarians and meat-eaters claim special advantages for their respective dietaries, while most people compromise by a judicious mingling of both. Much has been written about the "caloric values" of different articles of diet—that is to say, the units of heat and energy which they are deemed capable of producing—but probably the relish with which a man takes his food is quite as important a factor in nutrition as the theoretical "calories" of what he consumes.

Racial and individual tastes and habits have some bearing on the value of the dietary selected. The mode of cooking and of serving is also of great importance. A palatable dish stimulates appetite and promotes the flow of digestive juices, whilst unpalatable food destroys appetite.

Vitamins.—Experiments in feeding have shown that while the diet should contain the proper proportions of proteins, fats, carbohydrates, minerals, and water, other elements are required, without which the normal active growth and health are not maintained. These additional dietary requisites or "accessory food factors" have received the name of "vitamins," for there is more than one kind of vitamin. Only

a small quantity of them appears to be necessary, but their absence from the diet causes impaired growth, malnutrition, and various diseases associated with this. Vitamins seem to exist abundantly in vegetables and fruits, but also occur in milk, butter, suet, yolk of egg, and fish oil. The vitamins of good cod-liver oil are 300 times more powerful than those of butter, but are apt to be destroyed if the oil is not prepared at a low temperature. While these foods in their fresh or natural state contain some of these vital principles, the latter are easily destroyed or diminished by certain methods of preparing food. A very good example of this is found in rice. Its appearance is much improved by a process of polishing, but it has been clearly proved that the vitamin is contained in the outer layer of the grains, and that it is quite absent from polished rice. The method of sterilising milk known as "pasteurisation," if carelessly carried out, may destroy the milk vitamins, and some tinned foods lose their vitamins in the processes of preserving and canning.

Animal proteins are, on the whole, more rapidly digested than cereals, and therefore reach the circulation more quickly, but the effects of the latter are more lasting, and they provide rather better staying power. Sugars are more easily digested than starches. Now we see the necessity for a mixed diet; for, although many articles of food contain all the required constituents, the proportions of these vary greatly, and, except in the case of milk, are nearly always wrong, which leads to waste of money and of digestive energy. Thus, meat contains too much protein and too little carbohydrates, bread too little fat, and potatoes are nearly all water and starch. In an ordinary diet we adjust these deficiencies; for instance, we take meat and potatoes together, and remedy the want of fat in our bread by taking butter with it; we eat eggs with bacon, and porridge with milk. Vegetables contain a large amount of indigestible **cellulose.** This is one of the materials which make up the firm fibre in plant tissues, and it is hardly affected by the digestive ferments of the human body. It may be said, however, to serve a certain end in increasing the bulk of the fæces, thus stimulating the peristaltic action of the bowel, and also in spreading out the food in the intestine and so exposing it better to the action of the intestinal juices. At the same time, this large proportion of indigestible material is the greatest disadvantage of a purely vegetarian diet.

Nevertheless, vegetables and fruits contain many of the salts required by the body, and some of the essential vitamins; and fresh green vegetables should be included in every dietary. When it is not possible to obtain them, as used to be the case on long sea voyages, lemon-juice or some similar fruit or vegetable extract must be added to the daily diet to prevent the occurrence of scurvy.

Cow's milk is such an important article of food that it deserves special mention. It contains the food constituents in better proportions than any other article of diet, and it is the most perfect food for children. It contains approximately: protein (casein and other milk albumins) 3·5 per cent., fat 3·7 per cent., sugar 4·8 per cent., salts 0·7 per cent., and water 87·3 per cent. The proportions vary somewhat according to the season, the feeding, and the breed of cow. Its disadvantages are that it is too dilute, and would require to be taken in very large quantities if used as the sole diet, and that it is very subject to putrefaction. In hot weather, and unless kept very clean, it readily turns sour. It is, moreover, easily contaminated, and many epidemics are spread by disease germs carried in it. The warmer the milk the more rapidly do these germs multiply. It is therefore of the utmost importance that all milk should be kept in cool and airy places where there is no dust, especially in hot weather. The most scrupulous care must be used in cleaning milk cans and jugs, always scalding them out after cleaning. No dirt of any kind must be allowed near milk. Cow sheds, dairies, and milk stores should be models of cleanliness. The laws regarding the purity of milk and the careful regulation of dairies and dairy farms are now very strict, and rightly so. Milk from consumptive cows has been proved to cause tuberculosis in human beings. It may be sterilised and made quite wholesome and harmless by gently boiling for about a minute, but this renders the casein insoluble and is believed to diminish the vitamins. Cream is obtained by allowing milk to stand till the fat rises to the top, or by separating it out in a centrifugal extractor. It is, of course, much richer than milk, as it contains nearly all the fat.

Butter is produced by churning cream. This process breaks down the casein capsules of the drops of fat, and the fat is worked into a mass from which the curd is driven out. Good butter is the most palatable and most digestible form of fat, and is rich in vitamins.

Cheese is made from milk coagulated by rennet and squeezed

in heavy presses. As it "ripens" the casein undergoes fatty changes. It is a very valuable article of food, but many people find it somewhat indigestible.

Margarine is made from various animal and vegetable fats. Provided the fats used are fresh and clean, good margarine is a very useful substitute for butter and a wholesome and cheap article of diet, for the process of manufacture is scientific and it is never touched by hand. It is, however, deficient in vitamins.

Alcohol.—The use of alcohol in one form or another as a beverage is widespread, and few subjects have excited more controversy than its uses and abuses. Among civilised races the commonest alcohol-containing beverages are wines, beer, cider, whisky, brandy, rum, gin, and liqueurs. Alcohol can only be regarded as a food inasmuch as it may under certain conditions serve a limited use as a fuel. Its action is rapid and quickly wears off; and it is not stored in the tissues for future use. It is commonly spoken of as a stimulant, but it is really more sedative and narcotic (sleep-producing) than stimulating. For a short time it may allay the sense of hunger and of fatigue, and so dispel worry and ease anxiety by its soothing effects on the nervous system.

In some diseased conditions, in which the digestion of ordinary food and fuel is diminished, the body begins to draw upon its reserves and its stores of body fat. At such times a little alcohol, which is easily absorbed and oxidised, may serve as a fuel, and so help to reduce the drain upon the reserves. A small amount taken with food is often somewhat beneficial in old age. To the healthy it is a luxury, but a dangerous one. Its abuses are too well known to require special mention here.

Tea, Coffee, and Cocoa.—Decoctions and infusions prepared from tea-leaves or coffee beans are freely drunk all over the world. They contain caffein and similar substances, which are purely stimulant and not nutritive. Cocoa is also stimulating, but it contains a good deal of vegetable protein and fat, and is therefore nutritious, though difficult to digest.

Besides paying attention to *what* we eat, it is important to know *when* to eat and *how* to eat. Meals should never be hurried; it takes time to eat properly. Proper mastication of the food is most important, as it gives the saliva time to act on the starches, which if passed quickly into the stomach would hinder the digestion of the proteins. Besides, the more the food is

broken up and finely subdivided, the more easily is it acted upon by the digestive juices.

Injudicious feeding, irregular meals, and overloading of the stomach cause a great deal of the everyday sickness in the world. The digestive organs require periods of rest, and there should be about five hours between each meal. Three good meals a day are sufficient for every healthy individual. In the morning, after the fast of the night-time, a healthy man is hungry and wants a substantial meal, but if he has work before him it should not be too heavy. It depends very much on a man's occupation as to whether the principal meal should be taken in the middle of the day or in the evening; but there is much merit in the saying that " light suppers make long life." Very young people require rather more frequent feeding. Those engaged in hard physical work require more substantial feeding, and older people should be more sparing in their diet. This last point should be specially noted in institutions, and elderly patients should never be allowed to overload their stomachs with excessively hearty meals.

If too much is eaten not all is digested, and the digestive system is upset in many ways, often with serious and lasting effects upon the health.

SECTION V

PRINCIPLES OF NURSING THE SICK

Requirements and Management of the Sick-Room. — In large institutions the sick are nursed in a ward. The charge nurse is the responsible head of the ward in all matters, and she must be familiar with everything that is going on, for she is the person responsible for the patients and the treatment ordered. Before going off duty she must be careful to leave instructions for her deputy, and to record any serious symptoms.

Whenever the doctor enters the ward she should meet him at once. A junior nurse should always send for the charge nurse if she is absent, remaining with the doctor until her arrival.

At the bedside the nurse stands opposite the doctor. She should have the chart of the patient ready to show if required, and be prepared to answer any question that may be put. In answering questions the facts should be stated shortly and simply. If a question cannot be answered she should say so at once, and on no account make a guess.

Hot and cold water, nail brush, soap, and towel must always be prepared when the medical officer is about to make an examination of a patient; and a spatula, or tongue depressor, must be handy. A portable light should also be available, and the position of the wall-plugs known, so that it can be used without delay.

The following simple rules must be familiar to the nurse:

Bedclothes should never be pulled up or down in a lump; it hinders examination. When the nurse knows a patient is to be examined she should have him stripped, with a blanket covering him underneath the sheet. This enables any part of the body to be easily exposed, and avoids risk of a chill.

To expose the abdomen for an unexpected examination by the doctor: untuck the quilt and blankets and turn them well down, just below the hips, leaving the patient covered with the sheet.

Under cover of this get the nightgown pulled up. The patient is then ready, and only the sheet need be moved to expose the abdomen.

To expose the legs for examination: do the same at the foot of the bed; turn the blankets and quilt back above the knees, leaving the sheet only covering the legs.

To expose the chest for examination: in this case, unless otherwise directed, the nightgown or pyjama jacket must be entirely removed.

Care of the Ward or Sick-Room.—The nurse must observe the temperature, the ventilation, and the light of the ward or room. The surroundings of her patients—floors, walls, furniture, and instruments—must be scrupulously clean.

The **temperature** of the room or ward should be between 58° and 62° F. The nurse must be able to read the thermometer which hangs on the wall, and become familiar with the method of heating that is in use. In private houses this often requires great attention.

Ventilation of the ward is dealt with in Section IV. Remember that the essential points are to banish foul air and supply fresh air, and that, although this change must be continuous, patients must not be subjected to draughts.

Wards are usually specially constructed, but in private nursing considerable ingenuity may have to be exercised to obtain the right amount of ventilation.

Light.—This should be as abundant as possible by day, but blinds should prevent sunlight annoying the patient. At night only enough light to insure observation is used. Patients must not be worried by a carelessly shaded light.

Rooms in private houses or institutions that are used for sick nursing should be very simply furnished. Floors of wood, or covered with linoleum, are preferable to carpets. The curtains and other hangings should be of a material which is easily washed.

Cleaning the Room or Ward.—This important duty must be performed daily. The floor is dry-rubbed or polished. Where carpets and rugs are in use their cleanliness is best insured by the daily use of some form of vacuum cleaner. Sweeping stirs up dust in the atmosphere of the room, which resettles as soon as sweeping is over.

When polishing a floor remove all the dust with a damp cloth, then apply a little polish, and rub well, finishing with a soft

cloth. Old wax, which is apt to collect in the corners, must be scraped away. Beds must be pulled out, and furniture moved so that every part of the floor can be got at. Polished floors should not be made too slippery, lest the patients fall and injure themselves. After the floor, the chairs, window-sills, cornices, pictures, and ornaments must be dusted carefully, using a damp duster, and the brasswork must be polished.

Single rooms require special attention.

If soiled with fæces or wet with urine, the cleansing must be prompt and thorough. All soiled sheets, clothing, etc., must be quickly rolled up and taken instantly from the ward or room. The best place in which to go over soiled clothing and make a list of it is in the open air. Sheets and clothing from cases of infectious diseases, fevers, parasitic skin disease, dysentery, or typhoid should be disinfected as soon as they are taken off, and kept apart afterwards when sent to the laundry.

The ward lavatories must be kept clean and well ventilated. Bed-pans and urinals must be removed immediately after being used, cleansed, and washed with disinfectant. In certain cases of offensive disease, deodorizers may be put in the urinal or bed-pan before use—such as Sanitas or Jeyes' fluid.

A place for everything, and everything in its place, is a golden rule for wards or sick-rooms, not only for the sake of neatness, but in order that an article may always be found when wanted, and that patients may not get hold of anything with which they might harm themselves or others.

OPEN-AIR METHODS.

Much benefit is derived by some classes of patients from **open-air treatment.** By this is meant bed treatment in the open air, which may be either continuous or during the day only.

Phthisical patients are generally ordered to live in the open air day and night, and soon become acclimatised to weather conditions.

Many mental cases improve very rapidly under this treatment, especially persons convalescing from toxic insanities, such as alcoholism and puerperal insanity. Certain patients who have apparently become chronic may improve in an astonishing way if put to bed in the open air and fed liberally.

They must be kept warm in cold weather with extra blankets,

or hot-water bottles if necessary. Beds may be placed on verandas, in shelters, or in tents. The **veranda** is the most convenient, especially if it communicates directly with a sick-ward. In the summer, the sun should not be allowed to shine directly on the patients. This may produce serious burns or mild degrees of sunstroke. The veranda should be shaded or umbrellas or parasols provided.

Tents are not so satisfactory, and become very hot in summer. The bottom of the canvas walls should be turned up, so that air may circulate freely.

The **shelter** consists of a hut with one side open to the air. The ideal hut is one which will provide complete shelter from the rain, while allowing the maximum amount of ventilation and sunlight; and these huts are usually so constructed that they may be turned in any direction to avoid driving rain or to catch the sun.

Patients in bed in the open air very soon become inured to the changes in the climate, and suffer no discomfort even in the coldest weather if they are properly supplied with warm and light clothing and hot-water bottles. But it is no part of the treatment that they should get wet with rain or be exposed to the full blast of a storm. They must, of course, be kept dry, and bed clothing and mattresses should be protected from the elements by waterproof sheets if necessary, and all dampness avoided.

RECEPTION OF A NEW CASE.

General instructions for the routine measures to be carried out on the reception of a patient on admission to a mental hospital will be found in Section XII.

Here it is presumed that the patient has been resident in the hospital, and has been sent to the sick ward either for a closer observation of the state of the bodily health, or to undergo some special course of treatment, or to be put to bed for some intercurrent bodily disease. If definite instructions about the diet and other treatment required are not received along with the patient, the nurse should ask for them as soon as possible. Precise information should be obtained from the nurse who previously had charge of the case as to the mental state, habits, and tendencies of the patient; when the bowels were last moved and urine passed; the time and nature of the last meal; and, in the case of a woman, the recent facts about menstruation.

The patient should be weighed if possible, and the temperature and pulse and respiration rate should be recorded.

The body of the patient is next examined. The nurse must look carefully for:

(1) Signs of injury, such as cuts, scars, bruises, etc.

(2) Bed sores, skin disease.

(3) Ruptures, hæmorrhoids, distended bladder.

(4) Evidence of pain—especially pain on respiration—swelling, or tenderness in any part.

Anything noticed should be recorded.

SICK DIET.

There is no more important duty the mental nurse has to perform than the care of diets. She has to serve the food and to report the amount taken. Further, she may have to prepare it. A patient may be ordered:

Full or ordinary diet.
Middle or modified ordinary diet.
Milk diet.
Special diet.
Extras.

A **full diet** requires no explanation. The **middle diet** consists of tea and bread-and-butter, soup, perhaps fish, and milk pudding, and sometimes extras.

Milk Diet.—Milk is a complete food, and is ordered alone, or with mineral waters, or barley water. It should be kept covered and in a cool place or, better, the receptacle may be stood in a bowl of cold water. In hot weather it is better to boil the milk on its arrival. Boiled milk, however, is often unpalatable to patients, and an alternative is to pasteurise it. In some cases milk forms large masses of curd in the stomach, which are not easily digested. This difficulty may be removed by citrating the milk. Some cases require milk predigested, which is done by means of peptonising powders and pancreatic extract.

The nurse must ascertain how much milk is to be given and how often. In cases of weakness it should be given in a feeding-cup, which is held in the right hand of the nurse, the left hand being placed under the patient's pillows to support his head.

Milk recipes will be found under the heading Sick-Room Cookery.

Special Diets are ordered for medical reasons when, for example, patients suffer from gout, rheumatism, diabetes, renal disease, or epilepsy. In these cases the nurse is advised to make inquiries, and write down the articles the patient *may* eat, and those he may *not* eat, and to adhere strictly to the instructions obtained. She may also have to prepare meals for some patients, consisting of such dishes as custards, junkets, omelettes, and beef-tea. Recipes for their preparation will be found under the heading Sick-Room Cookery.

Extras.—It is the nurse's duty to see that any extras that are ordered or allowed, such as eggs, milk, butter, and wine, spirits, or beer, are duly supplied and reach the right patients.

All food must be served punctually, and at the proper intervals. The utensils must be kept scrupulously clean, and the food served as daintily as possible.

Preparation of the Patient.—He should be propped up with pillows and made comfortable, a napkin spread over the clothing and bedclothes, and his shoulders covered with a wrap. The nurse should see that the food is eaten before it becomes cold, and be able to state definitely how much is taken. Trays, napkins, and utensils should be conveniently placed, and a bed-table is generally necessary. All articles must be removed promptly when the meal is finished.

Feeding Patients.—Where a patient is unable to feed himself the nurse must feed him with a spoon. He will usually be on a fluid or semifluid diet. The patient is propped up, and the nurse takes a comfortable sitting position on his right side to avoid any temptation to hurry; a dessertspoon should be used, and she must not attempt to give a second spoonful until the previous one has been swallowed.

Patients Requiring Special Attention.—These include senile patients, imbeciles, epileptics, general paralytics, and depressed and suicidal patients. The first four classes are inclined to bolt their food, and eat voraciously and indiscriminately. Their food should be soft—bread with the crust removed and the meat minced. Depressed patients are inclined to eat too little, and require special and earnest care.

When food is not taken in sufficient quantity at any meal, a note must be made of the fact in the report book.

Administration of Fluids.—It is most important to pay attention to the quantity of fluid taken by patients, especially those

with fever. Plain water is gratefully received, and must very seldom be withheld. In fact, in many conditions of disease, patients must be encouraged to drink large quantities of water. In the rare cases when drinking water is forbidden, a patient may be allowed to wash out the mouth with tepid water. Ice may be sucked, but this tends to increase the thirst afterwards. Lemonade, "imperial drink," and barley water are all useful, and their preparation is explained in the section dealing with sick-room cookery. Patent preparations and predigested foods are used according to order. Beef-tea and jellies are much used for the sick; but these are stimulants, not foods, and are most serviceable as an aid to taking toast or dry biscuits. Rectal feeding will be referred to later (see Nutrient Enemata, p. 205).

ARTIFICIAL FEEDING.

This is performed by passing a rubber tube down the œsophagus into the stomach. It should never be attempted by a nurse except under special instructions. The tube may be passed through the mouth or the nose. Orally inserted tubes are of larger calibre than the nasal tube. Both kinds of tube should be got ready by the nurse when a patient has to be forcibly fed. Everything must be prepared before the operation.

Apparatus Required.—The tube, with an enamel or glass funnel, glycerine to lubricate the tube, a gag well protected with rubber tubing over the points, a small jug of warm water, the food, which must be at a temperature of 100° F., any medicines that are to be administered—in solution if possible. Castor oil will go down a tube readily if it is heated. The patient should be protected with a waterproof apron, and a waterproof apron or gown should be ready for the doctor. A bowl will be required to receive the funnel and tube after feeding, and bowl, soap, towel, and warm water must be prepared for washing purposes. The nurse must see that sufficient assistance is available. The patient may resist violently, and the kindest and safest way of completing the operation successfully is to use overwhelming force, rendering a struggle impossible. A good rule is a nurse for each limb and one for the head.

The patient may be sitting up in bed, on a chair, or lying down, according to medical instructions.

The Feed.—This consists generally of one or two pints of new milk, containing one, two, or even three eggs; and about a dessertspoonful of sugar, which must be fully dissolved. Care must be taken that the feed is not too hot, and for the nasal method it should be strained. When a patient is fed artificially over long periods, the diet is more varied, and may contain soups, meat juices, fruit juices, and even fish or vegetables, minced and passed through a hair sieve.

Some authorities prefer to use a large syringe or pump, which is attached to the end of the œsophageal tube. An ordinary dinner, consisting of meat, vegetables, and bread, is minced, mixed with sufficient warm water or milk to make it semifluid, and placed in the pump. The whole is then forced slowly down the tube by means of the piston.

Washing out the stomach is often done at the same time as tube-feeding, and, by using a 60-inch tube, the two operations may easily be performed together, the feed being last. There must be a liberal supply of sterile water, and a 1 per cent. solution of potassium permanganate is sometimes used.

SICK-ROOM COOKERY.

The nurse must see that food is served in an appetising manner. (Food which is meant to be hot should be really *hot*, not tepid, and should be served on hot plates.) Knives, forks, and spoons, napkins, and tray cloths must be clean.

The following recipes will be found useful:

Milk Preparations.—To **pasteurise** milk: the jug or other receptacle containing the milk is placed in a saucepan or boiler which contains cold water. This is placed on the fire or gas ring, and heated until the water comes to the boil. The milk is removed and allowed to cool. Germs are destroyed by this method without interfering in any way with the taste or nutritive value of the milk.

To **peptonise** milk: pasteurise 1 pint of milk. Do not take the jug of milk out of the hot water, but add two teaspoonfuls of liquor pancreaticus, and 20 grains of sodium bicarbonate. Stir well, and then put the saucepan back on the fire and boil the water for ten minutes.

Junket.—Pasteurise ½ pint of new milk, and pour it into a shallow dish. Add a teaspoonful of essence of rennet when the

milk is at about blood heat, stirring well. Allow the mixture to set.

Arrowroot.—Two teaspoonfuls of arrowroot are mixed into a fine paste with water. A breakfast cup of boiling milk is added, and the mixture boiled gently for three or four minutes, stirring constantly. Sweeten as required. Brandy may be added when ordered; the required amount should be put in after removal from the fire.

Milk Tea or Milk Coffee.—These are a pleasant change for a patient on milk diet. They are made by adding a cupful of boiling milk to an ounce or more of freshly prepared tea or coffee.

Bovril or other meat extracts may be used with milk.

Egg Preparations—Albumin Water.—Separate the whites of three new-laid eggs, and beat them gently, adding cold water gradually up to a pint A drop or two of lemon-juice and a little sugar may be added as flavouring.

Plain Omelette.—Take one or two eggs, break them into a bowl, and stir well with a fork, but do not beat into a froth. Place a small quantity of butter or lard in a frying-pan, which must be scrupulously clean. When the fat is hot, pour the eggs into the pan, adding a little salt and pepper. Cook on a brisk fire or gas ring. The edges of the omelette set first, and must be constantly lifted from the pan with a fork to prevent burning. As soon as the omelette is set—about three minutes are required—fold it over and turn it out on a warm plate. Sweet omelettes may be made by adding sugar or jam. Savoury omelettes contain chopped bacon, ham, cheese, herbs, etc.

Meat Juice.—Take 2 to 4 ounces of beef, scrape it well, and cut it up finely. Place it in a mortar and pound it, then cover it with cold water and add a pinch of salt. After leaving it covered for an hour in a cool place, strain through a hair sieve or muslin, squeezing out as much juice as possible.

Beef-Tea.—Take 1 pound of shin of beef as free from fat as possible, and cut it into long strips with a sharp knife. Place the strips together and cut them across into cubes. Put these into an earthenware jar, and pour on 2 pints of cold water. Add a small pinch of salt, cover the jar, and place it in a pan of cold water. Bring the water to the boil, and keep the whole simmering in an oven, or on a stove, for twelve hours. Allow to cool and remove the scum; flavour to taste. Note that beef-tea will

keep for a considerable length of time if the scum is not removed or if it is brought to the boil daily. But beef-tea flavoured with vegetables, especially onion, will not keep any length of time, and all flavouring should be put in just before serving. If the tea is required in a hurry, it can be prepared in just over one hour in the following manner:

Take the meat as before and place it in a clean saucepan with half a tumbler of water. Heat slowly for about a quarter of an hour until the meat commences to stick to the saucepan. Add 1 pint of boiling water and a pinch of salt. Boil gently for three-quarters of an hour, when the tea may be served. This method is only recommended when time is short. It is extravagant and wasteful of meat.

Calves' Foot Jelly.—Take two calves' feet. Cut them into small pieces, and pour on them 2 quarts of cold water. Bring to the boil, and keep boiling until the liquor is reduced to 1 quart. Remove the scum on the surface when cold, and place the jelly in a saucepan with the whites and broken shells of one or two eggs. Boil for ten minutes, and strain. If brandy or wine is ordered, it should be added as the liquor cools and well stirred. The jelly is then allowed to set, and served cold.

DRINKS.

Barley Water.—Pearl barley is added to water in the proportion of 1 ounce to the pint. The mixture is allowed to simmer for ten minutes, being stirred constantly. It is then cooled, strained, and a little sugar or lemon-juice added to flavour.

Lemonade.—Boiling water is poured on freshly cut lemons, two of which are required for a pint. The mixture is sweetened and cooled and kept covered.

Imperial Drink.—To a pint of boiling water add a teaspoonful of cream of tartar. Flavour with sugar and lemon-juice. Half a lemon will flavour a pint.

Toast Water.—Half a round of bread well toasted is cut up and placed in a quart jug. The jug is nearly filled with boiling water and allowed to cool. The water may be flavoured with lemon.

ADMINISTRATION OF MEDICINES.

The greatest care must be exercised in the storing and giving of medicines; errors may have grave results. A cupboard or press is best set aside exclusively for medicines in each ward. Poisons and poisonous lotions, applications, etc., should be kept in a separate cupboard, but when this is not possible they must be kept in a separate compartment or shelf.

All medicines or applications should be returned to the dispensary as soon as their use is discontinued.

The ward medicine press must be kept locked. There should be only one key, and this must always be in the care of the charge nurse or her deputy. No medicine, however harmless, may be given into a patient's possession. In a sick ward, when medicines are to be given, the bottles should be placed on a tray, together with a small basin of warm water and a glass-cloth, so that the medicine glass may be washed after each dose. One nurse looks after the tray while a second administers the mixtures, which must be given at their proper specified times. In pouring out medicines, the label side of the bottle should be kept uppermost. The label usually contains the patient's name, the number of the ward, and full directions as to the giving of the medicine. The nurse should read it carefully before taking the cork out, and again before putting back the bottle, which must be securely corked. Always shake a bottle and, when shaking, keep the cork in place by the forefinger. Never get into the habit of identifying any patient's medicine bottle merely by the colour of the contents. If medicine is poured out and not used it must be thrown away. One patient's medicine must never be given to another.

Headache powders, or patent preparations, the personal property of any nurse, or brought in by relations, must never, under any circumstances, be given to a patient.

Nurses must never introduce medicine into the food of a patient without specific instructions. The practice may encourage and confirm delusions, and undermine the confidence of a patient in his nurses.

1 minim=1 drop.	8 drachms or 2 tablespoonfuls =1 ounce.
60 minims=1 drachm.	20 ounces=1 pint.
1 drachm =1 teaspoonful.	2 pints=1 quart.
2 drachms=1 dessertspoonful.	4 quarts=1 gallon.
4 drachms=1 tablespoonful.	

Domestic measures (teaspoons, etc.) are never to be relied on, and a graduated medicine glass must always be used.

Drops vary in size according to the nature of the liquid and the bottle from which they are dropped, and where possible they should be measured in a minim-glass. When measuring medicine the glass should be held on a level with the eyes, and kept straight up; after giving the dose the glass must be washed and dried before being used again.

If a patient has any difficulty in swallowing medicine a draught of water given first is often helpful.

Water should always be available, and nurses must show consideration in this matter, for some mixtures have an unpleasant taste, which a draught of water will remove.

Pills are usually given with a little water. If they cannot be swallowed they may be taken with a little soft food, or broken up and given with a drink.

Powders may be dissolved or suspended in water or hot milk. They may be placed on the tongue, and washed down by a drink, given in soft food, or mixed with a little jam and placed on a piece of bread. Powders are frequently administered in " cachets " of rice-paper, which are readily swallowed whole.

Aperients.—These medicines are given at night, or first thing in the morning, before food. Black draughts or pills are given at night, while the saline draughts, such as white mixture or seidlitz powders, are given in the morning. Castor oil is usually given at night. It is best administered by heating a china medicine measure in hot water. Then pour about two teaspoonfuls of warm water into the measure, and on top of that the required dose of oil, and finish with a little orange-juice. The oil is easily taken in this way, and is scarcely tasted.

Nurses must use tact and care in giving aperients. A hurried dose given just at breakfast-time may result in the patient's losing his breakfast, his medicine, and his temper at one and the same time.

After the administrations are finished the glasses and tray must be carefully washed and put away in their proper places. Glasses in which oil has been given must be washed in hot water and soda.

Refusal of Medicine.—If a patient refuses medicine the fact should be reported. The nurse may point out to the patient that he is disobeying medical orders, but no compulsion should be attempted.

The action of medicines should always be noted, and effects reported. The long-continued use of bromides may produce skin eruptions. Drugs like quinine and salicylates may produce ringing or buzzing in the ears and headache.

If a nurse finds that a mistake has been made in giving a medicine she must report it at once. Never wait to "see what happens." The result may be trivial or of very grave consequence, possibly threatening the life of the patient. Report the mistake, therefore, without delay.

Hypodermic Injections.—These are made under the skin with the hypodermic syringe and needle. Syringes may be of metal, metal and glass, or all glass. They may be sterilised by boiling, but this is very injurious to syringes that have washers on their pistons. When glass syringes are boiled, the pistons and needles must be removed from the barrel and put separately into the steriliser. Syringes with leather washers may be sterilised in another way, by drawing up 1 in 20 carbolic, followed by rectified spirit. Where syringes are in constant use, they may be kept in a covered jar immersed in rectified spirit; thus they are always ready.

Apparatus required for injections: the syringe and needle, cotton-wool, solution to be injected, tincture of iodine or methylated spirit. In mental wards it is always desirable and often necessary to have an assistant. The operator draws up a little more than necessary of the solution to be injected, turns the syringe with the needle upwards, and, by pressing the piston, expels all the air from the syringe and needle. Meanwhile the assistant, with the wool and spirit or tincture of iodine, cleanses a small area of skin, free from veins and in any convenient fleshy part. The operator pinches up a fold of the cleansed skin, and introduces the needle sharply into the lower part. The skin is released, and the dose injected by gentle steady pressure on the piston. After the needle is withdrawn, a swab is held firmly over the puncture for a few seconds to prevent the fluid from returning.

Injections may be ready prepared in solution or provided in tablet form. A small table with the doses of the chief injections is given below. If in the tablet form, put the dose directly into the barrel of the syringe, replace the piston, and draw up sterile water sufficient to dissolve the tablet.

Another point to notice is that most metal syringes have a piston-rod that is graduated into minims, and is provided with

a screw that travels up and down it. After the fluid is drawn into the barrel, the screw is turned on the piston-rod until the required dose is indicated between the barrel and the screw.

In all cases the nurse must get the dose checked by a second person before making the injection. When no assistant is available, first cleanse the skin, and leave it covered with the swab soaked in spirit while the injection is prepared.

Having completed the injection empty the syringe, take off the needle, and resterilise them. When storing glass syringes, a little vaseline should be smeared on the piston to prevent it from sticking. The wire provided should be threaded through the needle, and both may be slightly greased with vaseline.

Stock syringes should be examined frequently to see that they are in working order.

Note that ether and brandy, when ordered as injections, are injected into muscles. The sites chosen are the front of the thigh, the fleshy part of the shoulder, or the buttock. The needle is pushed boldly into the tissues as far as it will go before the injection is made.

COMMON HYPODERMIC INJECTIONS.

Name of Injection.	*Strength.*	*Doses.*
Injection morphine tartrate ..	2½ per cent.	5–10 minims
,, strychnine	0·75 ,,	5–10 ,,
,, hyoscine	0·1 ,,	5–10 ,,
,, ergot	33 ,,	3– 8 ,,
Brandy	Pure	10–30 ,,
Ether	,,	30–60 ,,

OINTMENTS.

Ointments.—These may be necessary in the treatment of skin diseases, but the nurse must first remove crusts, scales, or scabs from the part affected before applying ointment, otherwise they are useless. Removal may be accomplished by spirit of soap (an alcoholic solution of soft soap). Sometimes a little warmed oil will assist. A starch poultice is also a useful method of removing scabs (see Poultices).

Ointments may be applied on the smooth side of lint or on gauze. Before renewing an ointment dressing the old applica-

tion should be carefully cleaned away by means of a suitable warm lotion—boric lotion, for example—and a piece of wool.

Inunction.—This treatment consists in the rubbing of ointments into healthy skin, with the object of promoting the quick absorption of the drug contained in the preparation.

Mercury is often administered in this way. The nurse selects a suitable skin area, such as the inner aspect of the thigh, or one side of the abdomen, which is washed with hot water and soap and dried. The prescribed quantity of ointment is then measured out and rubbed in. The same skin area must not be used twice in succession.

In patients who are much wasted cod-liver oil may be given in this way. It should be rubbed in gently twice daily over a large area.

Rectal Methods will be referred to under Suppositories (p. 207).

BEDS.

A narrow bedstead with a wire mattress covered with a good hair mattress is the ideal for nursing purposes. In mental hospitals, beds used for general wards are frequently very low, and the beds in the infirmary wards should be higher so that the nurse has not so much stooping when attending to her patients. Beds are obtainable which are 2 feet from the floor.

In wet and dirty cases the mattress is covered completely with waterproof sheeting.

In nursing the sick the bed must be made at least twice daily. It need not be stripped, but sheets must be smoothed and changed if necessary, and the drawsheet adjusted when used.

A long waterproof covers the mattress, then a sheet well secured by tucking in. All but the very light cases should next have a second and smaller waterproof sheet, covered by a drawsheet. A drawsheet is best made by cutting up old sheets that are no longer fit for general use. In this way a small sheet is obtained which stretches across the bed, over the small waterproof, extending from the pillow to the knees of the patient, and being tucked under the mattress at each side of the bed. When soiled this sheet can be completely removed and a clean one inserted. Another way of making a drawsheet is to fold an ordinary sheet lengthways and place that across the bed. When soiled this sheet, being very long, is pulled

across the bed, until clean sheeting takes the place of the soiled sheeting, which is tucked under the mattress. This method, however, has the serious disadvantage of keeping dirty and septic material in and about the patient's bed.

Beds must be kept neat and tidy, but the nurse should always remember that the comfort of the patient is her first consideration, and it must not be sacrificed to the general neatness of the ward. Two faults are common to nearly every hospital in the world: One is to see a patient with his feet immovable, pressed down by tightly stretched bedding across the foot of the bed. The other is the undue exposure of the shoulders, again partly due to tightly stretched bedclothes and partly to their being turned down too low for the sake of appearance.

To Change a Sheet or Waterproof—(1) *Under-Sheet.*—When plenty of assistance is available, two nurses can lift the patient, while a third removes the old sheet and quickly slips the new one in its place. In cases of severe illness, in which it is important to avoid fatigue, this plan must always be adopted. When no assistance is available and the patient can be moved, first untuck the under-sheet all round. Then direct the patient to roll over to one side of the bed. The dirty sheet is next rolled lengthways as far as the body of the patient, and the mackintosh sheet is wiped carefully. The clean sheet, rolled ready lengthways to half the width of the sheet, is placed on the bed with the clean roll next to the dirty roll. The patient now turns over on to the clean sheet, the dirty one is removed, and the clean one unrolled and tucked under the mattress.

When the patient cannot be moved, and there is no assistance, the procedure is similar, but the nurse must roll the under-sheet *across* and not lengthways, and work from above downwards. Roll the upper part of the soiled under-sheet downwards to the shoulders. Lift the shoulders gently and continue to the small of the back. Wipe the waterproof, and, keeping the patient lifted, slip in a clean sheet rolled transversely to half its length. Tuck in the upper part, lift the pelvis, and continue in the same way.

(2) *The Drawsheet.*—This can be changed by adopting the same principles, but when the short drawsheets are used it is best to remove the soiled sheet and the waterproof, clean the waterproof, roll it with the clean sheet, and unroll both together.

(3) *The Top Sheet.*—Remove all the blankets but one, and spread the clean sheet over this. The soiled sheet is then pulled down under cover of the blanket and removed. Then the blanket is brought over the clean sheet.

Waterproof Sheets must be changed from time to time, scrubbed with warm soap and water, and dried. Do not use strong carbolic lotion to purify them; it is injurious to the rubber. When stored they should be rolled on a wooden roller, and on no account folded, as that cracks the rubber.

Hot-water Bottles must always be in a flannel jacket or wrapped in a blanket. They must not be too hot, and should be placed beneath the under-sheet. The nurse must test the heat of all bottles with great care before putting them into use. A serious burn is produced on an unconscious or insensitive patient in an incredibly short time if these precautions are neglected.

Fracture Beds.—In the treatment of fractures the mattress must not be allowed to sag in the middle, as this may cause displacement of the broken ends of bone. To avoid this, fracture boards are placed under the hair mattress, but over the wire mattress. They only extend from the head to three-quarters of the way down the bed, and must not project beyond the edges. For convenience in nursing fractures of the lower limbs the mattress may be made in three parts, so that the central part can be removed for the purpose of introducing the bed-pan without disturbing or moving the patient. This is called the divided mattress.

Water Bed.—This is a rubber mattress which can be filled with water and used for patients specially liable to bed sores, from senility, nervous disease, or other cause.

Cover the wire mattress with fracture boards, then place the hair mattress in position, cover with a waterproof, and place the empty water mattress on the top of that. Fill it with water at 100° F. Make the bed in the usual way, but place an old blanket next to the rubber bed. Usually the body heat of the patient will keep the water in the bed at a sufficiently high temperature, but the nurse must always be on the watch lest it become too cold. This occurs with very debilitated patients, and the mattress must then be partly emptied and filled up with hot water.

Nurses must not forget that these beds are very costly, and the risk of puncturing them with a pin or needle must be avoided.

They must never be lifted when full, and when put away they should be rolled and never folded.

Air Beds are made up in the same way, but air takes the place of water.

Rubber rings filled with air or water may be used to relieve local pressure. They must not be over-filled, and must be kept scrupulously clean, and placed beneath the under-sheet.

Bed Rests.—Well-arranged pillows make the best rests when the patient has to be kept in a sitting position, as after some abdominal operations, and in certain chest and heart cases.

Pillows should be firm, except those used for the head.

Rests may be had which are made of wicker, and can be adjusted to any angle; in practice, however, they are never so satisfactory as skilfully arranged pillows. A pillow arranged under the knees is useful to prevent the patient from slipping down the bed, and can be kept in place, attached by safety-pins to the mattress or by bandages to the head of the bed.

Cradles.—These are used to keep the weight of the bedclothes from any painful or tender part. They should be strongly made, and are of various sizes and shapes, some to cover the abdomen, others for injuries of the extremities. Large cradles may assist in the reduction of fever, and should be used always with acute joint infections.

Cleansing and Toilet of the Sick and Infirm.—This description applies to patients in the infirmary ward or to private cases confined to their rooms from sickness or infirmity. The duties may be divided into:

1. Daily toilet.
2. Bath twice a week.

1. Patients in bed must be washed morning and evening. A bowl with warm water, sponge or flannel, and soap are taken to the bedside, and a towel is placed round the patient's neck. Having removed the bed garment, the face, neck, and chest are washed and dried, and then the hands. The hair should be combed and brushed, and the use of the tooth-brush encouraged where possible. The hair of female patients should be made up in two plaits, one each side of the head, and loosely tied. No woman's hair should be cut off without the consent of her friends, except under medical advice.

The private parts must be cleansed, and in a mental hospital the patient may not be able to assist even if given a flannel for

the purpose. This duty is especially important in the case of those patients who are helpless, and they must also be washed carefully after using the bed-pan.

The last part of the toilet consists in rubbing the lower part of the back with methylated spirit, and, after drying, rubbing in a dusting powder, which is usually made up of zinc oxide powder, boracic acid powder, and starch powder in equal parts. This not only does much to prevent bed sores, but is a great comfort to the patient. Male patients may require shaving. This is most important in private practice, and should be done daily if the patient is well enough. The nurse may do it easily with a safety razor, which must be kept locked up. After washing the bed is made.

2. All patients confined to bed should be given a **blanket bath** twice a week at least. The bedding is covered with a waterproof sheet; over this a blanket is spread. Another blanket is thrown over the patient, under which the sponging can be done without undue exposure. One part of the body is done at a time, keeping the other parts covered. As before, the face and neck are done first, then the chest, then the limbs, and lastly the back. Each part must be dried thoroughly before going on to the next. On these occasions the nails of the feet and hands should receive attention, and a thorough inspection made for any signs of commencing sores.

Dirty patients must be bathed daily, and the skin soiled by fæces and urine should be washed with spirit and dusted with powder. Helpless and debilitated patients who easily get bed sores must also be bathed daily.

BED SORES.

These are sores or ulcers which result from the death of the skin and underlying tissue, and are very easily produced in debilitated and wasted patients in parts subjected to pressure. Bed sores, in nearly every case, must be regarded as due to bad nursing, although there are exceptions in which they occur in spite of every possible care and precaution. They are most difficult to prevent in bed-ridden patients wasted by nervous diseases, such as general paralysis. A very high standard of nursing care is reached by those who are responsible for patients in the last stages of general paralysis in our large mental hospitals. The

appearance of a bed sore is rare in wards devoted to this class of case.

What are the causes of bed sores? Three factors are always present—namely: (1) nervous degeneration; (2) septic infection; and (3) local pressure.

Nervous Degeneration.—This is always the most important element in the causation of bed sores. It disturbs the nourishment and functions of the skin and underlying tissues, and generally causes some loss of sensation. This nervous element is the great predisposing cause of a bed sore, and that is why patients with nervous disease require such careful nursing.

Sepsis is the next element of importance. A wet and dirty patient is only kept clean with difficulty, and urine and fæces infect the skin, which may be on the point of breaking down into a sore. Even without incontinence, sepsis readily occurs in the skin unless great cleanliness is insured. Sweat and dirt, unless constantly removed, form a most favourable soil for the growth of organisms.

Local Pressure is the last factor to be mentioned. Sores occur chiefly in parts subjected to pressure—*e.g.*, over the sacrum, the hip-joint, the heels, ankles, and even the elbow. Patients may develop sores by lying with the knees one against the other; and badly fitting splints may also be a cause.

Signs of Threatened Bed Sores.—The skin becomes red and angry in appearance; almost at once a pimple appears which ulcerates, and the sore then enlarges with alarming rapidity. The nurse must be always on the watch for the most trivial skin changes. Often a slight change in the colour of the skin is missed, and when a pimple is seen the subsequent sore is inevitable. Any change in the appearance of the skin should be reported at once.

The Prevention of Bed Sores.—(1) All parts pressed upon must be washed with soap and water once or twice, or even more frequently daily. After washing, the parts must be carefully dried and rubbed lightly with a little spirit until quite dry, and then dusted with powder.

(2) Bed-ridden patients liable to sores, particularly if incontinent, must be inspected as a routine every quarter of an hour, day and night. If wet they must be changed. This inspection may be carried out very quickly, and with practice will not disturb a sleeping patient.

(3) The position of patients must be changed frequently and, although no general rule can meet all cases, a good plan is to change it half-hourly during the day and hourly during the night.

(4) Attend carefully to the bed. The mattress should be firm and smooth. The under-sheet and drawsheet must be kept free from creases and bread crumbs.

(5) Air beds and water beds, or suitable rings and cushions, can be used to relieve pressure when necessary.

As far as possible urine and fæces must be prevented from soiling the bed and patient. Males may use a urine bottle into which urine is received. A diaper may be used, with a pad of absorbent cotton-wool or moss kept against the perineum. Nurses must understand that if these are left wet for any length of time the cure is worse than the disease.

There are other aids to the prevention of sores. Some authorities recommend the use of specially prepared ointments for the threatened parts; some advise painting the skin with collodion; while others recommend the addition of a little washing soda to the washing water.

Treatment of Bed Sores.—The best treatment is prevention. If a bed sore does occur it must be kept scrupulously clean, dressings changed frequently, and the sore washed with boric or other lotion. Medical instructions must be very carefully followed.

OBSERVATION OF CASES.

Observations made by a nurse are frequently of great value to the medical officer. They must be accurate, stated very simply, and written down as soon as made. In sick wards day and night report books are kept for the record.

A *symptom* is something complained of by the patient, such as pain, giddiness, or frequency of passing water. A *sign* is something noted by the nurse or doctor, such as swelling, jaundice, or disturbed pulse.

Signs observed by nurses have a special importance in mental nursing, as some patients, though gravely ill, make no complaint, and the fact of their illness has to be discovered by a vigilant nurse. Other patients, although they complain, cloak their complaints in such a strange way that no notice is taken.

For example, a patient habitually full of delusions complained repeatedly that "his stomach was being electrified." Nobody paid much attention until it became obvious that he was indeed very ill. It was then found that he was suffering from acute peritonitis, resulting from an inflamed appendix. His complaint of electrification was simply his queer method of expressing severe abdominal pain.

Nurses must be familiar with the common signs and symptoms of illness, and the subject is here dealt with under ten headings, which should serve as a useful guide to the proper investigation of a patient suspected to be suffering from bodily illness:

(1) General appearance; (2) position and attitude; (3) pain; (4) temperature; (5) pulse; (6) alimentary system; (7) respiratory system; (8) excretory system; (9) sleep; (10) menstruation.

(1) **General Appearance.**—Observe the expression, which may be drawn, vacant, harassed, or anxious, often indicating pain. Note the colour of the face, which may be pale or flushed, cyanosed or red. Cyanosis is a blueness of the face, and in severe cases the lips and ears are seen to be blue also.

Notice the eyes. Are they bloodshot? Is there a squint? Watch the nostrils. In chest diseases, such as pneumonia, the muscles of the nose work regularly with inspiration and expiration. Examine the lips, which may be dry or moist, cracked or normal. In cases of severe illness they become very dry and cracked, and brown flakes of dried saliva, called *sordes*, appear.

Is there shivering or rigor? Are there any rashes or marked skin changes, such as pigmentation or bruising?

A nurse will readily see that by careful inspection a good deal of information can be obtained. It cannot be too constantly remembered that in mental nursing very little information may be given by the patient himself, and nurses should accustom themselves to observe *and report* any noticeable change in patients under their care.

(2) **Position and Attitude.**—Look for peculiarities in the gait, such as the appearance of a limp. Is the patient standing, sitting, or lying? Is there any alteration in his usual habits? Are there spasms or convulsions, such as occur in some serious nervous diseases?

The nurse should note if the patient shows any loss of power, or paralysis. In patients lying or sitting the knees are sometimes drawn up, indicating abdominal pain.

(3) **Pain.**—The presence of pain is always an important symptom. When complained of by a patient the nurse must find out where it is and also, if possible, its nature. Is it throbbing, darting, or aching pain ? Does it come and go, or is it constant ?

The nurse must be very cautious in making further investigations herself, but should note carefully from the patient's behaviour if there are any indications that the pain is increased by movement, and if it is relieved or aggravated by pressure. For example, a patient with a serious abdominal inflammation will lie still with the knees drawn up, shielding his abdomen from the pressure of the bedclothes, while a person suffering from a flatulent colic may twist about in bed and find some relief from pressing on the abdomen.

(4) **Temperature.**—The normal temperature of the body is 98·4° F. Slight variations occur according to the time of day or the amount of exercise taken. After violent exercise a temperature of 99° F. is frequent, and even after a hot drink an apparent pyrexia may occur. Again, a healthy person may have a morning temperature of 97·8° F. and an evening temperature of 98·2° F.

The temperature is taken with the familiar clinical thermometer. In sick-wards a useful plan is to keep thermometers in a small jar; a thick layer of cotton-wool is wedged tightly at the bottom of the jar, while the top is covered tightly with jaconet; 1 in 40 carbolic solution is placed in the jar before covering. The thermometers are pushed through small holes in the jaconet, and their bulbs rest on the wool.

Thermometers should be kept locked up when not in use.

There are several methods of taking the temperature.

(*a*) *The Mouth.*—This is the commonest method, although in mental nursing it may be impossible to adopt it, as is the case with children and with excited, mischievous, and impulsive, or depressed and suicidally inclined patients.

The thermometer is placed under the tongue, and the lips, but not the teeth, are closed. Nurses should allow ample time before reading, as thermometers, even when marked 'half-a-minute,' frequently require three minutes.

(*b*) *The Axilla.*—Wipe the axilla dry. Place the bulb of the thermometer in the centre and flex the arm over the chest. This is a particularly useful method in mental nursing. Beware of the intrusion of a fold of clothing.

(*c*) *The Rectum.*—A thermometer is lubricated with vaseline, and inserted into the rectum for a distance of two inches. Remember, in passing anything into the rectum, to pass it in a forward direction. A nurse using this method should remain with the patient. On withdrawal, the thermometer should be washed carefully, and again immersed in 1 in 20 carbolic. When rectal readings are constantly being made, a special thermometer should be kept for them. This method is always used with infants, and is useful in some mental conditions, such as stupor.

(*d*) *The Groin.*—Wipe the groin dry, and place the bulb of the instrument in the fold between the thigh and abdomen, then flex the thigh slightly, or get the patient to cross one leg over the other. This method is useful with children.

Always chart temperature readings at once. The care of charts is dealt with on p. 190. The varieties and significance of fever will be dealt with in Section VI. It may be useful to note here that normal temperature varies from 98° to 99° F., subnormal 97° to 98° F., collapsed states 95° to 97° F., slight pyrexia 99° to 100° F., moderate pyrexia 100° to 103° F., pyrexia 103° to 105° F., and hyperpyrexia 105° to 110° F. Rectal readings are from one-half to one degree higher than those obtained by other methods. When the rectal method is used, a note of the fact should be made on the chart.

(5) **The Pulse.**—Every beat of the heart sends a wave of blood through the arteries of the body and, wherever an artery is near the surface, this can be felt. The wave is termed the pulse-wave, or more shortly the pulse, and it may be felt in the neck (the carotid pulse), or in front of the ear; but it is usually noted at the wrist, where the radial artery, with the radius behind, is close to the surface.

It is examined by placing the first and second fingers over the artery found on the thumb side of the front of the wrist. Either wrist may be used, and as variations occasionally occur in the course of the artery, the nurse should try the opposite wrist if the pulse cannot be readily felt at the first attempt.

The nurse should note:

(*a*) The frequency of the pulse.

(*b*) Its regularity.

(*c*) Its fulness or amplitude.

(*d*) The condition of the artery.

When the pulse is examined the patient's arm should lie flat

on the bed or on some other rest, and the count should be made over one minute.

(*a*) *The Frequency.*—In an infant the pulse-rate is from 120 to 140 per minute; up to eight years of age about 100; up to fourteen years of age from 80 to 90; and the adult pulse varies from 60 to 80, the average rate being 72 beats to the minute.

The rate varies in different people: in some it is abnormally slow, in others abnormally quick, even in states of health.

The pulse-rate is quickened by exercise, by the taking of food, and by emotional disturbance. Alcohol, and other drugs which stimulate the heart, quicken the pulse-rate.

Fever increases it, and in severe pyrexial conditions it may reach 140.

(*b*) *The Regularity of the Pulse.*—Normally the pulse beats steadily, with the same number of beats in each minute and at equal intervals. In disease many kinds of irregularity may occur. The interval between the beats may vary; thus, two or three beats may follow quickly, and then a few more beats at a much slower rate. Such a pulse is termed **irregular.** Again, it may be noticed that beats or waves of the pulse appear to be missed entirely, giving an **intermittent** pulse. These facts when observed must be recorded by the nurse.

(*c*) *The Fulness of the Pulse.*—The fulness of the pulse is indicated by the volume of blood felt pulsating under the examining fingers. The artery may be conceived as an elastic pipe or tube, filled to a varying degree by each beat of the heart. When the beat is felt to be strong, and the volume of blood considerable, the pulse is said to be **full** or **bounding.** A **small** pulse is felt when the volume of blood perceived at each beat is less than normal. When it is very reduced the beat is scarcely perceptible to the finger, and the pulse is said to be **thready.**

(*d*) While the fulness of the pulse is being tested, the *condition* of the artery can also be estimated. Normally the radial artery is soft and almost collapsed between the beats, and is easily compressible, so that the beat is obliterated. When much more pressure than normal is required to obliterate the beat, it is described as a **high-tension pulse,** and means that the pressure of blood in the arterial system of the body is higher than normal. Such pulses are frequently found in mental cases where arterial degeneration has caused serious damage to the brain substance. Note that the volume of a high-tension pulse is generally small.

In certain diseased states the arteries become thickened and hard to the touch, the vessel does not collapse between the beats, and can be felt like a cord beneath the fingers.

(6) **The Alimentary System.**—Under this heading will be included the breath, the state of the lips, mouth, and throat, the tongue, the appetite, the presence or absence of vomiting, the nature of the vomit, constipation or diarrhœa, and the nature of the stools.

The Breath.—Note its odour; in acute illnesses the breath is often very offensive. Note carefully any characteristic smell such as might occur after a patient had swallowed a poison, as carbolic acid. A characteristic smell is noticed in the breath of patients who have been without food for some time.

The Lips.—Look for rashes, such as the outbreak of the sores known as *herpes labialis*, often seen in the early stage of acute pneumonia. Sordes, too, may be found, especially in febrile states.

The Tongue.—Is it coated or clean? Note its colour. The furring may be white or brown, and may occur in streaks or be evenly distributed. Is the tongue dry or moist, swollen or cracked? Is it protruded straight, or to one side or the other?

Find out if possible whether the patient has a sore throat; notice if there is dribbling at the mouth, or pain or difficulty in swallowing. Dribbling at the mouth is frequently associated with severe sore throat.

Appetite.—Refusal of food requires immediate investigation, and must always be reported. In mental nursing it is often important as signifying the onset of an acute illness, such as pneumonia. On the other hand, it may mean an attack of indigestion, severe constipation, or the presence of serious delusions, or hallucinations of taste and smell which lead the patient to suspect his food is poisoned, or of hearing which order him to refuse food. Further, it must be borne in mind that suicidal patients may attempt to starve to death, and refusal to take food may be the first evidence of suicidal intent.

Vomiting.—When a patient suffers from vomiting, notice its frequency and also the nature of the vomit. The act itself is important. Very forcible vomiting occurs in cerebral disease. Vomiting without nausea occurs in uræmia and hysteria. When it occurs in mouthfuls and without effort the condition is usually one of grave peritonitis.

A nurse should be able to say if there is any relationship

between vomiting and the taking of food or medicines, and should note carefully the amount, colour, consistency, and smell of the vomit.

The quantity generally depends on the amount of food in the stomach, varying from a mouthful to a very large amount. The latter occurs in cases of dilatation of the stomach.

The colour of vomited matter varies very much. The food or other matter swallowed will naturally influence it. From an empty stomach the colour is light yellow, or it may be green from the presence of bile.

"Coffee Grounds" Vomit, so called on account of its appearance, is due to the presence of blood in the stomach, altered by the action of gastric juice. It occurs in gastric ulcers, some duodenal ulcers, and after the taking of irritant poisons. Vomiting of blood is termed **hæmatemesis.** The blood may be bright, if quickly vomited in large quantities, but is generally dark. It is usually mixed with food, and is not frothy in character.

Fæcal Vomit.—This is the colour of dark beef-tea, and smells of fæces. It occurs in intestinal obstruction, and is a grave sign.

Foreign Bodies.—Mental nurses should remember to look for foreign bodies in the vomit, such as pins, stones, berries, leaves, or nails.

All vomited matter should be saved for medical inspection.

Fæces.—Here again the amount, colour, consistency, and odour will have to be observed. Is there constipation or diarrhœa? The amount of fæces varies with the amount of food taken, and no amount can be laid down as normal or abnormal. Very large stools occur after enemata given to constipated patients.

The *colour* of normal fæces is from light yellow to very dark brown. A good many variations can be observed. Green stools are usually very offensive in odour, and are due to the action of intestinal bacteria. Green-yellow stools, looking like pea-soup, suggest typhoid.

Black stools may be due to blood altered by partial digestion. This is spoken of as **melæna.** Stools may be turned black by the action of iron or bismuth salts taken in medicine. Light clay-coloured stools occur in jaundice.

Blood may be observed in the stools as bright streaks, not mixed with the fæces, in which case the bleeding has been due to hæmorrhoids or a lesion of the lower end of the rectum.

As has been noted, bleeding higher up in the intestines becomes black by partial digestion.

The Consistency.—A normal stool should be formed or half-formed. When a tumour presses on the gut the stools may be flattened like tape. Stricture of the gut may make stools appear round and small in diameter. They are termed "pipe-stem" stools.

Constipated stools are hard and drier than normal. In diarrhœa the stools become loose and liquid. Watery stools are very thin in consistency, and the movements of the bowels are accompanied by severe cramping pains. These stools occur in dysentery and cholera.

Very constipated fæces sometimes become impacted in the rectum as hard lumps, which may require removal by the fingers. Nurses must note that in spite of the presence of impacted fæces diarrhœa can still occur. Thus a patient may be seriously constipated while yet apparently the subject of diarrhœa.

Foreign bodies also occur in the stools, such as stones or other articles swallowed or inserted into the rectum. The various forms of worms may also appear, and must not be overlooked.

Unusual specimens of fæces must be kept for medical inspection.

(7) **The Respiratory System.**—In the observation of respiratory changes the nurse will begin with the character of the breathing and the respiration rate. Is the breathing difficult, wheezing or stertorous, or shallow and quiet? Such questions are easily answered by a little observation. The next thing to do is to count the respirations. If the patient is in bed the nurse takes a seat, and observes, watch in hand, the number of rises of the bedclothes per minute. This gives the number of inspirations, normally about 18 in an adult. Nurses must be careful to omit the expiratory movements, or downward fall of the bedclothes. It is interesting to note that there is a definite ratio between the pulse and respiration rates. Thus the normal pulse-rate is 72, and the respiration rate 18, which gives a normal ratio of 4 to 1. This ratio becomes much disturbed in diseases of the chest—*e.g.*, in a pneumonia case the pulse may be 90 and the respiration 30, a ratio of 3 to 1. A ratio of 2 to 1 is of grave significance.

The character of the breathing is shortly expressed by the following terms:

Wheezing.—A musical sound accompanying inspiration or expiration, and heard in bronchitis, or asthma.

Dyspnœa.—Difficult or painful breathing, when respiration requires much effort.

Orthopnœa.—Extreme difficulty in respiration, for which the patient sits up or requires to be propped up in bed.

Stertor.—A loud snoring noise evident during inspiration. This is heard in some cases of poisoning and many brain lesions.

Stridor.—A harsh, unmusical noise occurring during inspiration and indicating obstruction to the passage of air through the larynx.

Grunting.—Literally a grunt, which occurs at the end of expiration in pneumonia or pleurisy.

Sighing and **yawning** in illness are often signs of serious importance. Sighing is noted in cases of hæmorrhage; yawning in syncope or shock and collapse.

Cheyne-Stokes Respiration.—Nurses must be able to recognise this form of breathing. It occurs in varying conditions, and may be of slight or grave import. It is seen in inflammatory brain disease, in renal disease, in acute fevers, sunstroke, and senility. Mental nurses frequently have an opportunity of studying Cheyne-Stokes respiration among senile cases. As a general rule, if it occurs in acute illness, it is a sign of the utmost gravity. The respiration commences easily, but each succeeding respiration gets deeper and louder than its predecessor. This goes on till a maximum is reached and the respirations are long, noisy, and often difficult. They then steadily subside, like a tide which has flowed and ebbed. At this stage a complete pause occurs, which may last several seconds and even cause serious alarm. The cycle of events, lasting about a minute, then recommences.

Cheyne-Stokes, or "tidal breathing," as it is sometimes called, is very characteristic, but it may be confused with any respirations that tend to be grouped. For example, it is common to see a patient make two or three respirations of equal range and intensity followed by a pause, but this must not be confused with Cheyne-Stokes respiration.

Cough.—The nurse must observe the frequency of cough, whether it comes on at special times, if it disturbs sleep, or is painful, and, most important of all, whether it is accompanied by sputum (spit or expectoration).

The Sputum.—Careful observation of expectorated matter may be of great value to nurse and physician alike.

The points to remember are: (1) A specimen must always be saved; (2) the method of expectoration must be noted; (3) the quantity of sputum; (4) its character and colour; (5) its odour.

A specimen of sputum should always be saved for inspection by the medical officer. Until this has been done it is better not to add any disinfecting fluid to the spittoon or mug.

Note if the sputum is brought up all at once or at intervals, or if there is constant coughing. Note also if the amount is large or scanty, and whether it is expectorated easily or after much coughing and effort.

Note, too, its character, colour, and odour. The expectoration may be viscid—that is, thick and almost gelatinous in consistence, or watery, frothy, and plentiful. The colour varies greatly. A creamy colour denotes the presence of pus, and the sputum is described as **purulent.** Clear spit consists chiefly of mucus; when this is mixed with pus the sputum is said to be **muco-purulent.**

The other chief colouring matter is blood. This may occur as bright red streaks, as in phthisis. In pneumonia the blood is deep reddish brown, and distributed evenly in the matter expectorated. It is termed **"rusty"** sputum, or, when very dark in colour, **"prune juice"** sputum. When coughing produces bright red blood, as frequently happens in phthisis, there is **hæmoptysis.** This is a serious occurrence, and as it is often not easy to distinguish hæmoptysis from hæmatemesis, the chief points of difference are here tabulated:

Hæmoptysis.	*Hæmatemesis.*
Blood is bright red and often frothy.	Blood is dark, like coffee-grounds.
There is no food.	The blood is mixed with food.
The blood is brought up after coughing.	The blood is brought up by vomiting.

The Odour of Sputum.—A peculiar and offensive smell is observed in bronchiectasis and in gangrene or abscess of the lung.

The presence of foul-smelling sputum is an important sign, and must always be noted.

(8) **Excretory System.**—The excreta from the bowel have already been referred to under the alimentary system.

The condition of the skin should be noted: whether soft and moist or harsh and dry; if there is sweating, whether it is profuse, general, or limited to one region, or has any peculiar odour.

Urine.—An examination of this excretion gives a great deal of information, and nurses must be able to apply simple tests for the presence of abnormal constituents.

The examination falls under these heads: Amount passed in twenty-four hours, and frequency, colour, amount and character of deposit. Tests: for acidity or alkalinity; for specific gravity; for albumin; for sugar; for blood; for pus; for bile.

Measuring Urine.—The medical officer may direct that the total amount of urine passed by a patient be measured and recorded.

This is done by pouring the contents of the urine bottle into a large graduated measure and reading the ounces shown on the scale. This must be done each time the patient passes urine, and he must be warned not to pass urine except into the receptacle provided. The total is added up every twenty-four hours and entered on the patient's chart.

Collection of Specimens of Urine.—For ordinary purposes give the patient a bottle, and after use pour the contents into a specimen glass and label with the patient's name, and the date and hour of collection. Specimen glasses should be kept covered. If a laboratory specimen is required a sterile bottle is generally provided. Take care to see that the urine bottle given to the patient is clean and dry. It should be scalded and then dried.

Having obtained a specimen, transfer as much as is necessary to the sterile jar, cork tightly, label, and send to the laboratory at once.

"*Twenty-four Hour*" *Specimens.*—The medical officer may require a specimen of urine taken from all the urine passed in the twenty-four hours. In this case scald out and dry an enamel pail with a lid. Select a certain time (for example, 8 a.m.); direct the patient to pass urine at this time and throw it away. The patient now commences the twenty-fours hour with an empty bladder. All urine that is passed after this time is emptied into the pail. Special care must be taken to instruct the patient to pass urine before allowing an action of the bowels or part of the required specimen may be lost.

On the following morning at the same time (8 a.m.) the patient is instructed to empty the bladder, and the urine passed is added

to that already collected. The total amount is well stirred and accurately measured, and two or three specimens are kept in the usual glasses.

Nurses should note the frequency of the passage of urine, and if it be accompanied by pain or difficulty.

Colour.—Normally urine is a pale amber or straw-coloured fluid, but in disease it may become very dark or very pale. It may be coloured by bile in jaundice, when it appears a deep orange tint. Blood gives a smoky appearance to urine.

Deposit.—After being allowed to stand an hour or two, a deposit usually forms at the bottom of the vessel. It may be whitish, consisting of phosphates, or brick red, consisting of urates, and there is also a flocculent deposit of mucus.

Note that on boiling urine urates dissolve, while phosphates are precipitated or thrown down, as they are less soluble in hot water than in cold.

The deposit may be stringy or ropy in character, an indication of pus.

Requirements for Urine Testing.

6 test-tubes	1 bottle dilute acetic acid
3 specimen glasses	1 ,, No. 1 Fehling's solution
1 urinometer	1 ,, No. 2 ,, ,,
Red and blue litmus papers	1 ,, tincture of guaiacum
A spirit lamp	1 ,, potassium hydrate
Bottle of methylated spirit	1 ,, ozonic ether
1 glass rod	1 ,, strong nitric acid

Test No. 1: To test whether the urine is acid or alkaline. Litmus is the product of a root which has the curious property of turning red in acids and blue in alkalis.

Take a red litmus paper and dip it in the urine. No change in colour of the paper indicates that the urine may be acid. Now do the same with a blue litmus paper. It immediately becomes red in acid urine. No change in either indicates neutral urine.

Alkaline urine turns the red litmus paper blue. Litmus papers should be kept in a well-stoppered bottle.

Test No. 2: This decides the density of the urine, and is done by means of the urinometer. The density of distilled water is 1,000, and this is taken as the standard of comparison. For instance, milk contains other substances besides water, and its density or specific gravity is higher, say 1,016. The normal specific gravity of urine is from 1,015 to 1,025.

Place the urinometer carefully in the specimen glass so that it floats without touching the sides. At first it will tend to bob up and down. When it has settled down, take the reading on the scale and record it at once. A high reading, 1,025 or above, is obtained in diabetic or concentrated urine.

Test No. 3: For the presence of albumin. Take a clean test-tube and fill about a quarter of it with urine. Now boil with the spirit lamp. There may be no change. Generally a white cloud appears in the urine. This may be due to the deposit of phosphates or it may be due to albumin. Now add a little of the dilute acetic acid. Phosphates will dissolve at once, leaving the solution clear. If the urine remains cloudy, albumin is present. Write down the result.

Test No. 4: For the presence of sugar. Sugar occurs in the urine of diabetic patients. Pour into a clean test-tube enough of the Fehling's solution No. 1 to fill about half an inch of the tube. Add the same quantity of Fehling's No. 2 solution, and shake the tube. A clear, dark blue liquid results. Now boil, add a few drops of urine, and boil again. If sugar is present a striking change occurs. The solution turns a brick-red, due to the formation of an oxide of copper. The nurse should take no notice of any other colour change. If the tube be left to stand for half an hour, a brick-red deposit is formed at the bottom, and the upper part is clear fluid. The solutions are named after Fehling, the chemist who first described the reaction. This test should always be carried out before a patient is given an anæsthetic.

Test No. 5: For pus. Take the glass rod and stir thoroughly the urine in the specimen glass. Half fill a test-tube, and add some solution of caustic potash (potassium hydrate). On shaking, the pus is seen as ropy strands.

Test No. 6: For blood. Place half an inch of urine in a test-tube. Add a few drops of tincture of guaiacum and shake. Now add a little ozonic ether and shake again. The ether separates on the top of the fluid, and if blood is present it is seen to be tinted blue.

Test No. 7: For bile. Place a drop of urine on a white plate. Close to it place a drop of strong nitric acid. Let the drops mix, when a play of colours will be obtained if bile is present.

(9) **Sleep.**—The observation of a patient's sleep is of the first importance in mental nursing.

The nurse must record the duration of sleep and notice its character. Is it fitful or sound? Is there a long delay in getting to sleep, and does the patient dream or appear to dream? The hour of waking should be noted, and nurses must be on the look-out for talking or shouting during sleep, or such occurrences as sleep-walking.

(10) **Menstruation.**—In female wards a nurse should be on the look-out for variations in the menstrual periods of her patients, and for any unusual signs or symptoms at this period. Note the time elapsing between the events, the character and amount of the flow, and whether or not it is accompanied by pain. In acute mental illness it is common for menstruation to cease for a time. The duration of the menstrual flow should also be observed.

The Keeping of Charts, Records, etc.—From what has already been said, the nurse will realise the importance of recording *at once* the result of any observation made.

Every sick patient should be allotted a chart, which hangs close to the bed. This records the date, the day of illness, the temperature (morning and evening) the pulse, the respiration, the urine, the motions, the treatment given, the diet ordered. Some charts also record the hours of sleep. Sleep charts are of great importance and interest in mental hospitals, and should be kept for every recent admission.

In addition, unusual occurrences should be recorded on the chart, such as a fit, a rigor, the appearance of a rash, or the administration of a hypodermic injection. These are conveniently written down in the space above the temperature of the day on which they occurred, morning or afternoon, as the case may be.

It is sometimes necessary to record a temperature every four hours. Special charts are obtainable for this purpose. A patient should not be awakened in order to obtain his temperature without special orders. "Asleep" should be written on his chart to explain the absence of the record. It is unwise to let the patient know the changes in his temperature. This is specially important in private nursing, when the charts should be kept away from the patient, if possible in an adjoining room.

In keeping charts write in a small, neat hand. Avoid blots and erasures. When making the dot which records the temperature, do not be afraid of making it too large. Take care that

the lines joining the dots are straight. Make a stroke for every movement of the bowels. If a day passes without movement, indicate it by writing O. Menstruation in women may be indicated by an M; dressings by a D; and enemata by an E. These letters appear just below the top line.

SEPSIS, ASEPSIS, AND ANTISEPSIS.

Sepsis is a term used to denote infection by micro-organisms known by various names, disease germs, bacteria, bacilli, cocci, spirilla, etc. A cut finger generally heals rapidly; a scab may form, and drop off when the healing is completed. On the other hand, the cut may be invaded by micro-organisms, which cause sepsis. In this case the wound does not heal, but becomes tender and inflamed, and discharges the familiar matter known as pus. Sepsis may occur in any wound, abrasion, or sore after the invasion of organisms. We also use the term to denote infection of bodily organs. For example, dirty and decayed teeth permit bacteria to invade them, which flourish and multiply, giving rise to a "septic mouth" or "septic teeth," and often causing chronic ill-health on account of the poisons swallowed.

Further, we must realise that, when we attend to dirty or septic wounds, our hands, and the instruments we use, become septic in their turn, and, if they are used again before the bacteria upon them are destroyed, they may infect other wounds or sores.

Asepsis.—This is the term used to denote the exact opposite of sepsis. It is a condition in which no septic organisms are present. It is the aim and ideal of all who have to deal with wounds to promote healing in a condition of asepsis. In surgery especially asepsis is essential for the success of operations. Everything that can be devised to prevent the access of germs to the wound is carefully planned. Thus, instruments are kept very clean, and are boiled to kill any bacteria present. The operator and his assistants are clothed in gowns rendered aseptic by heat. Hands are enclosed in aseptic rubber gloves. Masks and caps are worn to prevent the spread of germs from the mouth or hair of those taking part in the operation. The skin of the patient is specially prepared, and rendered as free from germs as is possible.

Antisepsis.—This term includes all measures used to destroy bacteria or germs. The introduction of antisepsis marked

the greatest advance in surgical treatment that has ever been made, and is associated for all time with the great Lord Lister.

Heat is the most powerful antiseptic, no organism being able to withstand for long the temperature of boiling water. That is why all instruments are boiled before use in dressings or operations.

But, in addition, there are a number of chemical substances which have the power of killing bacteria. These are termed antiseptics, and they are generally used as solutions in water. They act in different ways with varying degrees of strength, but their use is the same—namely, to combat and prevent the invasion and growth of bacteria.

In nursing mental cases, there is one difficulty in the use of antiseptics. Nearly all antiseptic solutions are poisonous, some of them, such as perchloride of mercury, being very strong irritant poisons. This fact necessitates the greatest care and watchfulness on the part of nurses in mental hospitals. Antiseptic solutions must always be under lock and key in the poison cupboard, the requisite amount being taken from the stock bottles, which are then replaced in the cupboard, which is again locked.

Another warning is necessary. Nurses will understand that some mucous membranes of the body are very delicate, and would be easily injured by strong chemicals. The mouth and throat are examples; but the most sensitive organ is the eye, and only the weakest antiseptics may be used in treating it, or disastrous results may occur. Boracic lotion is the one antiseptic a nurse should ever use for the eyes without special instructions.

The chief antiseptics in use are here classified in groups for convenience.

Group I.: Mercury Preparations.

Perchloride of Mercury.—This is the most powerful germicide known, and is also a strong irritant poison. It is used in a strength of 1 in 1,000 or 1 in 2,000. It is generally put up in tablets, which are coloured blue or purple, and give a blue or purple solution. One tablet dissolved in a pint of water gives a strength of 1 in 1,000. It must not be used for instruments as it turns them black.

Biniodide of Mercury.—This is used in spirit solution. The fluid is usually coloured pink. Strength to be used, 1 in 500. A very useful but expensive antiseptic for sterilising hands or the skin. The drug is a strong irritant poison.

Other Mercury Preparations.—Two other mercury salts may be mentioned: ammoniated mercury is used in some skin diseases in the form of an ointment. A diluted form of this ointment is used for the treatment of eye conditions; and the yellow oxide of mercury is contained in the familiar "golden ointment."

Group II.: Silver Group.

Silver Nitrate.—Solid silver nitrate in the form of pencil-like sticks is familiarly known as "caustic." It is used for the cauterisation of possibly infected wounds or the destruction of too rapidly growing granulation tissue in ulcers or wounds, the so-called "proud flesh." It is a very strong poison.

Silver nitrate solution is sometimes used in ophthalmic cases and for painting the throat.

Argyrol.—This is a silver preparation also used in ophthalmic cases, in solution in water from 5 to 20 per cent. Protargol is a similar substance, but stronger.

Group III.: Coal-Tar Preparations.

These are conveniently classed together, as they are all manufactured from coal tar.

Carbolic Acid, or Phenol.—This is familiar to most nurses, and is a very widely used antiseptic. Pure carbolic acid is sometimes used for cauterising bites or infected wounds. It is the most common antiseptic for instruments. Strength, 1 in 20. This strength is suitable for disinfecting clothing, or the excretions and sputum of patients suffering from infectious disease. For mucous membranes or wounds the strength used is 1 in 80. It is poisonous.

Lysol.—This is a very useful preparation, especially for the hands. It gives a pleasant soapy solution with water, as it contains a certain amount of soft soap and will make a lather, especially when the water is warm. For disinfection purposes 2 drachms to 1 pint of water may be used. For hands or vaginal douches 1 drachm to 1 pint of water.

Picric Acid.—This occurs in solid yellow crystals. It is useful in the treatment of burns. Strength in water 2 per cent.

"Cresol," "Jeyes' Fluid," "Cyllin," "Izal," are all proprietary coal-tar preparations, and are especially useful in the care of water closets, sinks, etc.

Group IV.: Chlorine Group.

Chlorine water is easily made, but is not in general use as an antiseptic. It is a useful gargle in cases of sore throat.

Eusol.—This is a preparation invented during the Great War in the laboratories of Edinburgh University, hence the name E(dinburgh) U(niversity) Sol(ution). It is easily made, and is a very useful antiseptic in the treatment of wounds.

Take equal parts of chloride of lime and boracic acid and mix thoroughly. Add 1 drachm of the mixture to 1½ pints of water. Allow to stand for twenty-four hours, shaking occasionally. The solution may be strained or not, as desired. It is used undiluted or diluted by an equal quantity of water.

Chloros.—A solution of calcium hypochlorite, to which washing soda has been added to reduce the acidity. Used undiluted for the treatment of wounds, like eusol.

Group V.: Iodine Group.

Iodine, as a 2 per cent. solution in rectified spirit, is largely used for the disinfection of the skin before operations.

Tincture of Iodine, 1 drachm in 1 pint of water, makes a solution for washing out wounds or mucous membranes.

Iodoform.—A yellow crystalline substance with a penetrating and characteristic smell. It depends for its action on the liberation of free iodine. It possesses moderate antiseptic properties, but is offensive on account of its odour. **Bipp,** another War preparation, is a paste of bismuth and paraffin with iodoform. These pastes are often used for tuberculous sinuses.

Group VI.: Substances which liberate Oxygen.

Many germs are destroyed by free oxygen, which has a special influence on putrefactive bacteria. Substances which liberate it easily are therefore much used as deodorisers.

Hydrogen Peroxide.—A clear fluid which readily gives up oxygen. Most useful in septic wounds. On reaching the

diseased tissues the fluid bubbles and effervesces. It is a good wash for septic teeth or a gargle for septic throats, diluted with an equal part of water. It is used undiluted (10 volumes) or with equal parts of water for wounds. This fluid is expensive, and should be kept in a well-stoppered dark bottle in a cool place, or it rapidly deteriorates.

Potassium Permanganate is a purple crystalline substance. Its chief use is as a deodoriser. It is a very weak antiseptic. Strength of solution, 1 in 500 to 1 in 2,000. It loses its colour if used in strong solution, and stains everything brown. In a strength of 1 in 2,000 it is sometimes used to wash out the stomach. Permanganate of potash appears to have a powerful effect on gonococci, the organisms that cause the venereal disease known as gonorrhœa. For this reason a solution varying in strength from 1 in 4,000 to 1 in 1,000 is in frequent use for irrigating the urethra in the male or vagina in the female.

" Sanitas " is a proprietary preparation, useful in the cleaning of water closets, soiled floors, or sinks.

Group VII.: Alcohol and Allied Substances.

Methylated Spirit and Rectified Spirit possess antiseptic properties. Rectified spirit is useful as a solvent of other antiseptics—*e.g.*, iodine and biniodide of mercury. Instruments may be sterilised by immersing them in rectified spirit for twenty minutes. Scalpels—which if frequently boiled become blunt—are often sterilised in this way.

Formalin.—This is a liquid with a peculiarly pungent odour. It is not an alcohol, but it is very closely allied, and is manufactured from it, and is therefore included in Group VII. A 10 per cent. solution can be used as a disinfectant floor wash; a 1 per cent. solution is used as an inhalation in some cases " Solid formalin " or, to give it its proper name, " paraform " is a white substance, sold in lumps which readily decompose, and give off formalin vapour. These are used in special lamps to fumigate rooms after infectious disease. Catheters may be sterilised by placing them in a long glass cylinder with a special lid, containing a few lumps of paraform.

Lysoform is a useful preparation, made from formalin and soft soap. It sterilises hands and instruments, but it quickly loses its power unless well stored.

Group.	*Name of Antiseptic.*	*How Used.*	*Uses.*	*Strength.*	*Remarks.*
Mercury Group	Perchloride of mercury	Solution in water	Disinfecting	1 in 500 to 1 in 1,000	Turns instruments black Is a strong irritant poison, and is rarely used for irrigating wounds
			Compresses to purify skin	1 in 2,000	
			Douche	1 in 4,000	
	Biniodide of mercury	Solution in rectified spirit	For disinfection of hands or skin	1 in 500	Is not good for instruments An expensive antiseptic
Silver Group	Silver nitrate	As a solid stick ("caustic")	For cauterising wounds or the destruction of granulation tissue	Solid	A strong irritant poison
	Argyrol	In watery solution	Useful in certain eye conditions	1 to 4 per cent.	—
Coal-Tar Derivatives	Carbolic acid, or phenol	Pure	For cauterisation of wounds	Undiluted	Highly poisonous—a corrosive Has an anæsthetic effect
		Solution in water	For immersion of instruments, disinfection purposes, floors, clothes, excreta, sputum	1 in 20	Is not good for operator's hands, as it numbs the skin. In this strength is a severe irritant poison
			Sometimes used to purify skin As a gargle or for washing out wounds	1 in 80	Poisonous. Antidote. Large quantities of Epsom-salts
	Lysol	Solution in water	For sterilisation of hands	1 drachm to a pint	A good antiseptic. It makes a soapy solution with water
			Douches	Ditto	
			Disinfection, including infectious clothes and excreta	2 drachms to a pint	—

Coal-Tar Derivatives	Picric acid	Solution in water	For burns	2 per cent.	—
	Cresol Jeyes' fluid Izal	Solution in water	Disinfection of floors, sinks, etc.	2 drachms to a pint	—
Chlorine Group	Chlorine water	As prepared	For septic throats	As prepared	—
	Eusol	In solution	For wounds, or as irrigating fluid	Undiluted or with equal part of water	—
Iodine Group	Iodine	Solution in rectified spirit	Disinfection of small wounds or the skin	2 per cent.	Injurious to starched aprons and other linen, to which it gives a blue stain
		Tincture of iodine	Douches	1 drachm to a pint of water	Sometimes gives rise to nausea, vomiting, high temperature, and skin rashes
	Iodoform	In powder or as paste—B.I.P.	Dusting wounds, or the paste is rubbed in. Tuberculous sinuses are usefully treated with paste	In B.I.P., 10 per cent.	Has a powerful and penetrating odour
Oxidising Agents	Hydrogen peroxide	Undiluted, or with equal part of cold water	For septic wounds or teeth	Pure or diluted with equal part of water	Is expensive, and should be kept in the dark well corked Effervesces
	Potassium permanganate	Watery solution	As deodoriser and disinfectant	1 in 500	Stains tissues and linen brown if used too strong. Should not be used for instruments
			For washing out stomach	1 in 2,000	
			As urethral or vaginal irrigation in gonorrhœa	1 in 4,000 to 1 in 1,000	
	Sanitas	Solution in water	Deodoriser and disinfectant for closets, sinks, spittoons, floors, etc.	—	—

Group.	*Name of Antiseptic.*	*How Used.*	*Uses.*	*Strength.*	*Remarks.*
Alcohol Group	Alcohol	As rectified spirit, or methylated spirit	For the sterilisation of instruments, such as scalpels. A good solvent for other antiseptic substances	Undiluted	—
	Formalin	Solution in water	As a disinfectant	10 per cent.	These substances are not alcohols, but are very closely allied to the alcohols chemically, and are classed with them for convenience.
			Sometimes used for inhalation	1 per cent.	
	Paraform (solid formalin)	In solid lumps, which give off formalin vapour	For disinfection or fumigation. Can be used to sterilise catheters	—	Note that a special lamp is required to vaporise the lumps of paraform
Miscellaneous	Boracic acid	As dusting powder or solution in water	As a mild antiseptic for dressings, irrigation of wounds, etc.	Solution	—
			Good lotion for immersion of sterilised catheters	2 drachms to 1 pint of water	—
	Listerine	Solution in water	Can be given internally	Undiluted	A pleasant preparation containing boracic acid
			A good mouthwash	2 drachms to 1 pint of water	

Group VIII.: Miscellaneous Antiseptics.

Boracic or Boric Acid.—A white crystalline substance not very soluble in water. It is a weak antiseptic. The solution is made by dissolving 1 to 2 drachms in 1 pint of hot water.

It is a useful lotion for the eyes. It is not poisonous, and in mental practice this characteristic is a great advantage.

Sterilised catheters may be kept immersed in boric lotion, which is non-irritating.

Boracic acid in the form of a fine powder is usefully combined with starch and zinc oxide to make a dusting powder.

There are a number of patent preparations in use, of which boric acid is the active principle. The chief of these is "Listerine." This has not strong antiseptic properties, but is a pleasant mouthwash, and can be used internally.

ANTISEPTIC PRINCIPLES

Nurses must get a clear idea of the essential measures necessary to check the spread of infection from one patient to another. Consider the case of a patient suffering from typhoid fever. The organism causing the condition is well known, and occurs in the urine and fæces of the patient, on his skin, and consequently in his clothing. It is easy for a few of these organisms, carried by a careless nurse's hands, clothing, or other means, to find their way into the food of another patient, infecting him in turn with typhoid fever.

Or, again, a patient suffers from an abscess which discharges freely and requires frequent dressings. Instruments used, and probably the nurse's hands, will be contaminated. If now, without antiseptic precautions, another case be dressed, say a clean wound of the scalp, infection may follow and produce at the best a septic wound to deal with, and at the worst serious blood infection, and death.

The Disinfection of the Hands.—It is impossible to render the hands sterile, and for this reason many authorities consider that when attending to an infectious case or doing dressings surgical rubber gloves should always be worn, the gloved hands being rewashed between each dressing.

Rubber gloves can be made sterile by boiling; their smooth surface does not harbour germs; they can be more effectively

cleansed than the hands between dressings; and more powerful antiseptics can be used than could be tolerated by the bare skin.

Before putting on the gloves turn up the sleeves above the elbow, and scrub arms and hands well with soap and water and a nail brush. Clean the nails carefully. Then dip the hands in lysol solution (1 drachm to the pint), or biniodide of mercury in spirit (1 in 500), or perchloride of mercury (1 in 1,000), or whatever lotion is being used for the hands.

The same cleansing of the hands when gloves are not worn must be carried out carefully before and after attendance on an infectious case, and before and after a septic dressing, however unnecessary and irksome the precaution may appear to the nurse.

GENERAL RULES FOR NURSING INFECTIOUS DISEASES.

The Patient.—Isolate at once, and have one nurse detailed to the case. All the clothing and bedding is to be considered infectious. What is sent to the laundry must be sent separately, after having been steeped in 1 in 20 carbolic acid lotion and wrung dry. A complete set of utensils must be set aside for the patient, and kept in his room if possible. This will include plates, knife, fork, spoons, cups, feeder, medicine glass, bed-pan, urine bottle, sputum mug, and thermometer. After use they must be boiled or immersed in 1 in 20 carbolic. Sputum, vomit, urine, and fæces must be covered with 1 in 20 carbolic and allowed to stand two hours before being thrown away.

The Nurse.—When attending to the patient it is advisable to wear an overall, which must be longer than the dress and be kept in the room of the patient. The sleeves must be turned up above the elbow, and the hands disinfected after every attendance on the case.

The Room.—When the patient has left his room close all openings. Block up the chimney, and paste brown paper over windows and over ventilators. Open drawers if there are any. Spray the room and its contents with formalin solution. Then place a formalin lamp, with tablets ready for burning, in the centre of the room. A formalin candle is obtainable, and is simpler than the lamp. Either lamp or candle should be placed in a bucket containing water to avoid the risk of fire. Light the lamp or candle, shut the door, paste brown paper over the cracks, plug the keyhole, and leave for twenty-four hours.

Then ventilate freely and scrub out the room, and wash over the walls with soap and water and with 1 in 20 carbolic acid lotion. Papered rooms must be stripped and repapered.

DRESSINGS AND APPLICATIONS.

The dressing of wounds and sores must be done with aseptic and antiseptic precautions. Firstly, get all the things ready for the new dressing. Undo the bandage of the old dressing, and wash and disinfect the hands. When several dressings are to be done, it is more convenient to use rubber gloves. Wash well, and then put on the gloves. These may be dipped in strong antiseptic. After one dressing is completed the gloved hands are again washed and scrubbed with soap and water and redipped in antiseptic. The wearing of rubber gloves when a number of dressings have to be done is quicker, and protects the hands from the effects of antiseptic lotions. Then remove the old dressing and apply the fresh one. Foul dressings should be handled with forceps, and disposed of by burning. Sterile dressings are kept in tins or drums that are sterilised daily. Almost any tin may be made to serve as an easily sterilised receptacle for dressings if a number of holes are punched in the bottom, sides, and lid of the box to allow steam to pass through. A towel lines the box, and the dressings are covered with a towel.

Gauze.—White gauze three or four layers thick is a good absorbent dressing for surgical purposes, and should be kept cut into convenient squares. Gauze can be soaked in various antiseptic lotions and wrung dry just before use. Over the gauze a pad of absorbent wool is placed, and this pad must be an inch larger all round than the gauze.

Dry gauzes impregnated with antiseptic substances are sometimes used, but they not infrequently cause skin irritation.

Antiseptic gauzes and their colours:

Boracic gauze	Pink.
Cyanide gauze	Mauve.
Sal alembroth, or perchloride gauze	Blue.
Iodoform gauze	Yellow.

After the dressing and wool are applied, a bandage is used to fix them in position. Bandages may be replaced by adhesive plaster, which often requires heating before it sticks.

A warning is necessary to mental nurses with regard to the use of safety-pins. Usually a bandage is fixed by one of these, but in mental nursing a mischievous, restless, or impulsive patient would be sure to interfere with the pin, possibly to his own or another's hurt. Above all, safety-pins must never be used in the case of a suicidal patient. The bandages must be sewn, or replaced entirely by plaster.

Hot Fomentations.—A " wringer " is required, plain or boracic lint, wool, jaconet, bandage, hot water, and a bowl.

A " wringer " is easily made out of jack towelling about 2 feet long. Make a deep hem with stout thread at each end of the towelling. Slip wooden rods through the hems. Place the lint in the middle of the wringer and give a turn or two to the wooden rods. Place the wringer in the bowl, with the ends over the sides of the bowl. Pour boiling water over the wringer until the dressing is covered. Lift the wringer out, and by twisting the sticks in opposite directions the lint will be wrung dry.

The lint must be of ample size to cover the area to be fomented. It must be folded double, with the woven side outwards. When it is dry-wrung, it is applied immediately, and covered with jaconet, then wool, and a bandage.

Both jaconet and wool must be larger than the lint and ready at hand. If there are several fomentations to be made, the wringer may be dipped into a boiling steriliser.

For fomenting parts other than wounds or sores, folded flannel or blanket material may be used instead of lint, and large areas may be covered.

Stupes are fomentations with some remedy such as turpentine, opium, or belladonna sprinkled over the fomentation. Thus, a turpentine stupe is made by sprinkling 1 drachm of turpentine over the fomentation just before applying it. This application, when on the skin, must be looked at frequently, and removed when the skin is reddened.

Poultices—*Linseed Poultice.*—Collect pudding basin, spatula or blunt kitchen knife, unbleached calico or old linen, a board, linseed meal, gauze, jaconet, wool, binder, and boiling water. Cut the linen or calico to the required size, allowing a good margin all round. Spread it on the board. Pour boiling water into the basin to warm it. Place the spatula in the bowl. It is a good plan to warm the linseed meal before the fire or in the oven before using. Empty the water from the bowl, and pour enough boiling

water to make the poultice. Add the meal quickly, stirring with the spatula until it is of the right consistency. Turn out the hot meal on to the calico—it ought to leave the bowl quite clean. Spread the meal with the hot spatula about ½ inch thick. Turn over the edges of the linen and cover the surface with a piece of gauze. Apply the gauze surface to the part, and cover with jaconet, wool, and a binder. If there is much distance to traverse between the patient and the table, it is a good plan to carry the poultice between two heated dishes. Never apply a poultice too hot, and do not press it down on the skin of the patient.

Mustard Poultice.—Add 1 part of mustard to 5 parts of linseed meal. After mixing, proceed as directed above. Mustard leaves are often used. These must be soaked in warm water and applied firmly, covered with wool, and bandaged. A mustard leaf must not remain on for more than thirty minutes.

Starch poultices are used, in some skin diseases, to remove crusts before applying the ointments. The starch is made into a stiff paste with cold water, and then mixed with boiling water until it becomes clear. It is allowed to cool, when it forms a jelly. This can be applied spread on lint or linen, and covered with jaconet and a light bandage.

Bread Poultice.—Stale bread is soaked in boiling water, the water drained off, and the paste spread on lint. Boracic powder may be added.

Fig Poultice.—This is a useful application to a gumboil. The fig is toasted, the skin from one side is pared off, and that side applied to the gum as hot as can be borne.

Compresses.—A cold compress is comforting to a patient with a sore throat. Wring a piece of flannel, or a double thickness of lint, out of cold water. Apply to the part, cover with jaconet, wool, and a bandage. Compresses should be renewed when dry.

Evaporating Dressings.—Useful for sprains. Place the limb to be treated on a piece of jaconet or a waterproof sheet. Apply lint which is wrung lightly out of a lotion consisting of 1 part of methylated spirit to 5 parts of water. Bandage lightly, preferably with a gauze bandage. A cradle should be placed over the limb to allow free evaporation. The dressing may be kept wet by dropping on the lotion without removing the bandage.

An evaporating lead lotion may be used, and is even more soothing to the patient.

Ice Bags.—These are made of rubber, and have an airtight screw valve. Ice is broken up into small pieces, and the bag half filled. A sprinkling of salt may be added. The rubber bag is placed on the head and tied to the bed-rail in order to prevent it from slipping. It must be removed when the ice is melted.

Blisters.—These may be produced by a blister plaster or blistering fluid.

Blister Plaster.—Wash the part, and shave if necessary. Gently heat the plaster, and apply. Cover with gauze and strap lightly. When the blister is raised, remove the plaster. Snip the blister with sterilised scissors, drain the fluid from it, and cover with an ointment dressing.

Blistering Fluid.—Prepare the skin. Smear vaseline round the site of the blister; then paint on the fluid with a brush. When the blister is formed, snip it and dress as before.

ENEMATA.

The nurse must know how to give:

(1) Purgative enemata.
(2) Nutrient ,,
(3) Saline ,,
(4) Medicinal ,,

Purgative Enemata.

Simple or Soap Enema.—Apparatus required: A Higginson's syringe and a large bowl (or douche can and rectal tube, with clip or tap), vaseline, waterproof sheet, bed-pan, and the solution. A simple enema consists of 1 drachm of soft soap or a little more, and a pint of warm water. Mix until lathered, and see that the temperature is about 100° to 104° F.

Get the apparatus ready on the right side of the patient, who lies on his left side with the knees drawn up. Place the waterproof sheet under his buttocks. When using a syringe, see that it is in good working order, fill it, take care that air is not injected into the rectum, lubricate the nozzle of the syringe with a little vaseline on a piece of lint, and smear the anus with a little vaseline. The nurse must be able to see the parts. Pass the nozzle of the syringe into the rectum with the right hand. Note that as the anal canal points backwards, a forward direction must be given to the instrument. Fumbling with the nozzle, and attempts

to pass it in a backward direction, cause much discomfort. The patient is encouraged to hold the enema for a few minutes, and is then put upon the bed-pan. The character of the result must be noted. If the patient complains of pain or discomfort before the whole of the solution has been administered, the operation must be stopped. Instead of a douche can, a rectal tube and length of rubber tubing attached to a funnel may be used. The enema solution is poured steadily into the funnel.

Glycerine Enema.—This is made by injecting 2 ounces of glycerine with a glycerine enema syringe, which has a capacity of about 4 ounces, and a curved vulcanite nozzle. A patient should retain the enema for twenty to thirty minutes.

Oil Enema.—Olive oil is the most frequently used enema. Four ounces of olive oil, warmed to a temperature of 95° F., are injected by means of a glycerine syringe or a rectal tube and funnel. The enema should be retained for twenty to thirty minutes.

Both glycerine and oil enemata may be followed by a simple enema.

Turpentine Enema.—This consists of 1 to 4 drachms of turpentine added to a simple soap enema. It must be mixed carefully or the oil separates. A good plan is to beat up the turpentine with the white of an egg, when an emulsion is formed which mixes more readily with the soap solution. The syringe must be carefully cleaned, as turpentine corrodes the rubber.

Nutrient Enemata.—Patients who are unable to take food by the mouth may be fed by the rectum. Apparatus required: Rectal tube, short glass tube, rubber tubing and clip, glass or enamel funnel, lubricant, the fluid to be injected in a glass measure standing in a bowl of hot water, and waterproof sheet. The rectal tube is connected with the rubber tubing by means of the piece of glass tubing. The funnel is fixed to the upper end of the tubing, and the whole immersed in hot water to warm the apparatus. The nurse must make sure that there is nothing in the rectum, which should always first be washed out with warm water. The bladder should be emptied before administering the enema.

The Feed.—This varies according to the instructions of the doctor. The quantity should not be more than 4 ounces, unless the patient can retain it. For example: Peptonised milk,

2 ounces, one egg, or the white of an egg, glucose solution to 4 ounces. Brandy may be added if ordered. The temperature should be 100° to 104° F. Fill the tube so as to expel all air and clip it. Then insert it into the rectum, as already described, for about 6 to 8 inches. Unfasten the clip and let the fluid run slowly. Four ounces should take a quarter of an hour. When the fluid has passed, withdraw the tube, swab the anus with wool, and see that the patient is dry.

Medicinal Enemata.—These are not very frequently used, and will not be described in detail. The nurse should know that they may be ordered, and ask for full instructions. Starch and opium enemata are occasionally given in severe diarrhœa. An injection of quassia may be ordered in cases of intestinal worms.

SALINE INJECTIONS.

Normal saline is a solution of common salt, the strength being 0·8 per cent. This fluid can be used to replace blood, with which it mixes safely. It can be given by the rectum, by intravenous transfusion—that is, injection into the veins, or subcutaneously—*i.e.*, under the skin. It may also be required in operations to wash out abscess cavities or wounds, and must always be made in large quantities in readiness. It is supplied from the dispensary in institutions, but compressed tablets are in use, one of which, dissolved in a pint of water, makes normal saline. Or a strong solution may be made containing 1 drachm of salt in each ounce. One ounce of this added to 19 ounces of water will be normal saline solution.

Saline solution is made with sterilised water and brought to the boil before use. Jugs or other receptacles for it must be scrubbed with soap and water and boiled.

Saline solution is often mixed with glucose solution 6 per cent. This should be made from pure glucose, but lump sugar can be used as a substitute in emergency. Some authorities use a solution of gum acacia in place of saline.

Rectal Saline Injections.—Apparatus: A nasal tube, a glass funnel, and a jug for the saline fluid are all that is necessary. A rubber catheter (size 12) may be used, connected up with a piece of rubber tubing.

The temperature of the saline solution should be 110° to 120° F. in the jug.

The bed must be protected, and the patient lies on his left side or his back. Insert the tubing into the rectum and pour the fluid very slowly into the funnel, so that it passes into the rectum at the rate of 10 ounces in a quarter of an hour. This rate will be regulated by the height of the funnel. The patient must be kept covered up. Note carefully from time to time the rate of flow of the saline and its temperature, which must be kept up by adding fresh hot saline if necessary. Remove the tube if the saline is not being absorbed.

Intravenous Salines.—Nurses never give intravenous saline injections, but they should be familiar with the operation and know its requirements, which are: Intravenous needle, rubber tubing, reservoir, saline solution at 110° F., tincture of iodine, a bandage, waterproof, and towel.

The whole apparatus must be sterilised and filled completely with saline solution. Wash, and paint with iodine, the skin over the bend of the elbow. A bandage is applied to the upper arm of the patient so that the veins are made prominent. The needle, tubing, and reservoir being full of saline, the doctor inserts the needle into the selected vein, and the saline is allowed to flow. The speed of the injection is regulated according to medical orders in each case. The nurse's hands must be disinfected. A collodion dressing should be placed over the puncture.

Subcutaneous Salines.—Apparatus required: A large needle, tubing, reservoir, and a clip, all sterilised; saline solution, wool, iodine, and collodion. The needle is inserted under the skin in the breast or flank region, which must be washed and painted with iodine. The saline runs when the clip is removed. The nurse must be careful to see that the patient is kept covered. When the requisite amount has been administered the needle is withdrawn and a collodion dressing applied. The nurse's hands must be disinfected.

SUPPOSITORIES.

Cone-shaped bodies containing drugs made up with cocoa-butter or gelatine, and introduced into the rectum. They are not much used in mental nursing. They are:

(1) Evacuants, when made of gelatine and glycerine.

(2) Nutrient suppositories, which contain beef extracts.

(3) Medicinal suppositories, containing drugs such as morphia and cocaine, and used for the relief of rectal pain.

The gelatine or fatty substance dissolves, and the contents of the suppository are absorbed by the rectal mucous membrane.

To insert them, the patient lies on his left side with the knees drawn up, the suppository is lubricated with vaseline and pressed steadily into the rectum, being pushed up an inch or two with the finger.

After an evacuant suppository, the patient should lie on his face for a quarter of an hour in order that the suppository may dissolve and soften the fæcal mass.

CATHETERS.

There are male and female catheters. Both kinds may be made of silver, rubber, or gum-elastic. The soft rubber catheter is the best for general use. Nurses may pass female catheters in institutions, but male catheters are generally passed by a doctor. In private nursing, male catheters are frequently passed by nurses.

Absolute cleanliness is essential for the successful use of a catheter. The bladder is easily infected, and the infection may spread to the kidneys and bring about a fatal result. Especially is this the case with males. The male urethra is long and complicated in structure. It is not nearly so easy to pass a male catheter, and not so easy to treat an infectious bladder as in the female, where the urethra is short. When a male catheter has to be passed, the very existence of the patient depends upon the care which the nurse devotes to the principles of asepsis and antisepsis.

When catheterisation is necessary over long periods, the nurse must be on the look-out for the appearance of ammoniacal urine. A smell of ammonia is certain evidence of an infected bladder.

Passing a Female Catheter.—Apparatus: A soft rubber instrument (size No. 8) is the best. This should be boiled, and placed in boracic lotion, or saline solution, or boiled water. Dry swabs, warm lysol lotion, two bowls, one to receive the urine and one for the dirty swab, and a waterproof sheet, are required.

Method.—Having collected the apparatus, and placed it on a table on the right-hand side of the patient, turn down the bedclothes to the knees, and, having pulled up the night clothes, cover the upper part of the patient with a blanket. The patient lies on her back, with the thighs separated and the legs slightly

drawn up. A suitable case may be directed to lie on the left side with the legs drawn up. Place a bowl between the thighs. The nurse must now disinfect her own hands and arms. Push up the blanket with the elbow. With a large swab dipped in lysol clean the external genitals. Then separate the labia with the left hand and cleanse the parts from above downwards with the right hand, using a fresh swab. A clean swab may be placed in the orifice of the vagina, and another placed over the exposed meatus. Take the catheter in the right hand, and pass the tip straight into the meatus, allowing the catheter to touch nothing on the way; see that the free end is in the receptacle. Push gently onward, and urine will flow after 3 inches is inserted. The left hand may now be removed and the patient covered. When the urine has ceased to flow, withdraw the catheter slightly; a little more urine may flow. Ask the patient to cough, or press gently with the hand over the bladder, and the bladder will be quite emptied. Withdraw the catheter gently, remove the vaginal swab, clean the parts, and leave the patient quite dry and comfortable.

In performing this operation the nurse must be able to see exactly what she is doing. No misplaced idea of modesty on the part of patient or nurse must be allowed to interfere with efficient catheterisation. A hand lamp may be used if the light is bad.

Passing a Male Catheter. —The apparatus required is the same, except that a slightly longer catheter is used and a lubricant is required. Glycerine will serve, or a tube of sterile paraffin.

The patient lies on his back, with the knees separated and slightly drawn up. Take the penis in the left hand and draw back the prepuce, or foreskin. The glans of the penis must be cleaned thoroughly with the swabs and lysol solution. Some authorities prefer to have an antiseptic compress left on the glans for half an hour before catheterisation.

Leave a swab on the glans and place a bowl between the thighs. Carefully wash and disinfect the hands. Then take up the catheter and pass it into the meatus. Push gently onwards. If resistance be met with, hold the catheter in position for a short time and again push onward. It should slip easily into the bladder. Empty as in the female, and when the urine ceases to flow withdraw it slowly, and wash the parts.

Cleansing and Sterilising Catheters.—Silver and rubber catheters may be boiled. Do not put catheters into strong antiseptic solutions before use, as the chemical will irritate the urethral mucous

membrane and cause pain. Place them in boracic lotion, or sterile saline solution, or even boiled water.

To clean catheters, wash them well in soapy water or boil them in a soapy solution. Next run cold water through from a tap or syringe, passing the stream from the eye of the catheter. Dry with a cloth, and hang them up until quite dry. They must then be laid flat and straight, or cracks will develop. Gum-elastic catheters are sometimes placed in airtight catheter tubes containing formalin. A convenient way to keep both rubber and gum-elastic catheters is to use an enamelled catheter box with a lid, half filled with a mixture of glycerine and water in equal parts. After washing, the catheters are put into the box, in which there is plenty of room for them to lie straight. The mixture is sterile, and the catheters can be taken out of the box for immediate use, and are already lubricated.

After the passage of a catheter the nurse must be on the look-out for symptoms of pain—shivering, rise of temperature, and sometimes a considerable amount of shock. This condition is called " catheter fever," and must be reported at once.

DOUCHES.

Vaginal douches may be required in mental hospitals after childbirth, in some cases of puerperal insanity, and occasionally for old women who develop offensive discharges.

Apparatus: Douche-can with the prescribed lotion at the right temperature, good length of tubing, a vulcanite vaginal nozzle, which should have a tap, swabs, bowl of lysol lotion, waterproof sheets, and a pail or bed-pan. The nozzle, tubing, and douche-can should be sterilised.

A 1 per cent. lysol solution is very commonly employed; and iodine lotion (1 drachm of the tincture to 1 pint) is also used. Temperature of the douche 106° F. Douche for hæmorrhage and suppression of lochial discharge, 120° F.

Protect the bed with waterproof sheets. Place the patient on her back and remove the pillows; then raise her on to the bed-pan (the " Perfection " is the best). The light must be good so that the steps of the operation can be seen clearly. The nurse cleanses and disinfects her hands, while an assistant separates the thighs and swabs the parts with the lysol lotion. Insert the nozzle of the douche, having made sure that the tubing and

nozzle are quite full of the lotion. Turn the tap gently. When finished turn the tap again and withdraw the nozzle. Swab and dry the parts.

INHALATIONS.

Steaming Preparations.—It is sometimes required to keep the air breathed by a patient moist and warm. For this a steam kettle is required, and a tent over the head end of the bed. This may be specially procured, or improvised out of two large clothes-horses and a couple of sheets. The kettle has a spirit stove and a long spout. It is boiled gently, and the spout is kept under the tent. The temperature under the tent should be from 70° to 75° F.

Steam Inhaler.—This is an earthenware jar with a glass mouth-piece. A jug may be used if the patient's head and the jug be covered with a large towel. The purpose of the inhaler is to allow the patient to inspire the steam, which is generally mixed with the vapour of some drug, such as creosote, friar's balsam, or eucalyptus.

To prepare for use: Warm the inhaler with some boiling water. Pour this away, and place in the jar the required quantity of the drug. Pour on boiling water, and wrap the inhaler in flannel. Instruct the patient to inspire through the mouth and expire through the nostrils, the process to be continued until the water gets cool.

Dry inhalations are also used. A cone-shaped mask of perforated zinc, with a sponge in the centre, is placed on the face, covering the mouth and nostrils, and secured by elastic bands round the ears. The drug is placed carefully on the sponge, and the patient keeps the mask on for a definite length of time. This inhaler is often used in phthisical cases.

Oxygen inhalations are given in heart and lung cases. The gas is sometimes passed direct from the cylinder through warm water, or alcohol, to a funnel which is held about 8 inches above the patient's face. This method is wasteful and inefficient, and is now replaced by oxygen inhalers. These consist of a mask to cover the nose and mouth, attached to which is a bag filled with gas from an oxygen cylinder.

SPECIAL BATHS.

Hydrotherapy, or treatment by baths, has been increasingly popular of late years, and is a valuable addition to the means at our disposal for the treatment of mental illness. It is most valuable in cases of excitement, whatever may be the underlying cause, and in some stuporose states. Hydrotherapy is chiefly given in the form of a prolonged immersion bath, the hot or cold pack, or the needle bath.

The Prolonged Bath.—This is given at a temperature of about 98° to 100° F. It has a marked effect on maniacal patients. It is given daily, and the immersion lasts about half an hour the first day, and is prolonged from day to day until a patient may remain in the bath for four or five hours. As improvement takes place the duration of the bath can be reduced. The temperature must be kept up by the nurse, who must remain with the patient for the duration of the immersion. Much can be done by the use of tact to keep the patient quiet during the treatment. Some authorities use a lid to the bath with a hole in it, through which the head of the patient projects. This should rarely be necessary. Copious drinks are administered during the treatment, and rusks or biscuits may be allowed. Towels and warm blankets should always be at hand. The pulse should be examined, if possible, from time to time, and any marked change reported at once. Fainting can be dealt with by rapidly running the water off and covering the patient with blankets, lifting him out when his condition improves. Female patients should be allowed to wear a suitable garment such as a chemise while in the bath.

Wet Packs.—These may be either hot or cold. They are given to reduce temperature, to produce sleep, and to allay restlessness and excitement.

Remember that a patient in a pack is considered to be undergoing "mechanical restraint."

The Cold Pack.—The patient is stripped and laid on a bed covered with a waterproof sheet and a blanket. Three blankets are in readiness. A large sheet is wrung out of cold water in a bath or tub by the side of the bed, and in this the patient is wrapped so that every part of the body is covered, and the sheet is tucked in round the neck. He is then covered quickly with the blankets, which are tucked tightly round him. Its duration should not be more than fifteen to thirty minutes.

The patient must not be left, and his condition must be carefully watched. When the time is up, he is uncovered, dried, and well covered in his bed. A hot bottle is put to his feet.

An evaporating pack for the treatment of hyperpyrexia is made by preparing a solution consisting of 1 part of methylated spirit to 7 parts of water. The sheet is wrung out of this solution, and the procedure is as for the cold pack, except that covering blankets are omitted.

The Hot Pack.—This is especially useful in cases of restlessness or excitement. It is given in the same way as the cold pack, except that the sheet is wrung out of boiling water. This is best done in a large towel.

The Needle Bath.—This is useful in stuporose conditions, and consists of a number of fine sprays. The patient is placed on a special table or in an ordinary bath, and the sprays are played over his body and limbs. It is followed by brisk friction. The water may be hot or cold. Patients with blue extremities should not be treated with cold water.

Shower Baths.—Shower baths, which may be hot or cold, are sometimes given. There are a few points to be remembered in their administration. Never let the patient feel that he is being punished by a cold shower, and never surprise him by turning it on without proper warning. When it is over, rub him down with a dry, warm towel, and keep up the friction until a good reaction of the skin is produced.

Sponging.—Sponging a patient may be ordered to reduce a very high temperature, and is useful in allaying restlessness and producing sleep. Use tepid water and a sponge, and wring out the sponge lightly. Proceed as in giving a blanket bath, and if given for hyperpyrexia, take the temperature after the bath and record it on the chart. If it is not reduced, a second sponging may be given after ten minutes' interval. Should the patient show signs of collapse during the sponging—rapid, weak pulse, pallor, or shivering—stop at once, apply warm blankets and hot bottles, and give a hot drink.

The Sitz Bath.—This is given in a specially shaped bath. If that is not available a tub will serve. It is a remedy which must be tried for retention of urine. The patient sits in warm water (100° F.) with the pelvis well covered. He must be encouraged to pass urine in the bath. He may remain in the bath for fifteen minutes.

Hot-Air Baths.—The most satisfactory way of giving these is by means of a big cradle fitted with electric light bulbs. The patient lies on a blanket, the cradle is covered with a waterproof sheet and a blanket, and the bedclothes cover all. The bath is continued, at a temperature which must be recorded by means of a thermometer, for half an hour or more, according to medical direction. The patient is wrapped in warm blankets at the end of the bath and then dried carefully. The nurse must be on the look-out for blistering, which occurs very quickly in some cases.

Medicated Baths.—They contain some remedy such as mustard, sulphur, carbolic, etc. A mustard bath is prepared by mixing up mustard in water to make a thin paste. Half an ounce of mustard to every gallon of the bath is a suitable proportion. The water should be hot, over 100° F.

Other medicated baths are prepared according to medical directions.

SPLINTS.

A splint is any appliance used for securing immobility in a part of the body, and, in the case of a fractured bone, is employed to keep the bone at rest while healing takes place.

Splints of various kinds are also used to correct deformities, but these will not concern a mental nurse.

In mental practice, the use of splints may present special difficulties. A patient suffering from delusions may not believe that he has actually broken a bone, and may consequently be difficult to nurse. Splinting is then very necessary, and has to be done thoroughly.

There are a great many types of splint, and a knowledge of them can only be acquired by practical demonstration. A nurse, while training, should take every opportunity of seeing, handling, and applying them.

They are made of wood, of metal—steel, iron, zinc, or aluminium—or of prepared tissues, such as poroplastic or papier mâché.

Poroplastic material is convenient splinting, as, after being cut to the required shape, by warming it gently it can be moulded into any desired form, and sets when cold.

Gooch splinting is sold in large sheets, and can be sawn to any size. It is made of narrow strips of wood glued to a pliable

fabric, so that it can be rolled and folded on itself, and so moulded to a limb to some extent. It can also be used as a straight splint.

In emergencies, any suitable material that lies to hand may be made use of, and examples of these temporary splints are given in the Section on First Aid (p. 128).

The Padding of Splints.—Nearly all splints require padding before use. This can be done with small pillows stitched in position, or by means of calico, wool, or tow.

Method.—Cut a piece of old linen, muslin, or calico, 6 inches longer than the splint and four times its width. Lay the strip flat. On it place some non-absorbent wool for the length of the splint. Then pad with well-teased tow until the necessary thickness is obtained. Turn the edges of the calico over to the middle line and stitch them together, taking care to pick up the wool with a few of the stitches. Now place the pad on the splint, the sewn edge being next to the wood. Turn the whole over, so that the splint is uppermost, and stitch the pad in its position. Commence 2 inches from the end of the splint, and work across and across until within 2 inches of the far end. Thread should be used, and a stout cross-bar of thread made at each end of the splint where the stitching finishes. To finish the ends, trim off unnecessary wool and tow. Gather up the calico, and stitch it firmly to the thread cross-bar at each end of the back of the splint.

Towelling may be used as padding in an emergency.

Preparation of the Patient.—The limb should be gently washed with warm water and soap (it is generally best to shave it, especially if strapping is to be used to secure the splint), dry carefully, swab over with a little methylated spirit, and then dust freely with boracic acid powder. If the splint projects into the axilla this should always be shaved. Anæsthetics are often given during the setting of a limb, and the necessary apparatus should be available. In addition, bandages, adhesive plaster, wool, needle and thread, linen webbing straps, and small pads should be got ready.

Extension.—This term is used to describe the continuous pull it is sometimes necessary to maintain on a limb, whether it be for a fracture or for joint disease. In a fracture it prevents overlapping of the ends of the bone, and consequent shortening of the limb. Extension is commonly produced by means of a weight and pulley, and the necessary requirements and method of application are here described.

Requirements.—Shaving requisites, cord, extension stirrup, adhesive strapping, bandages, heater for the strapping—either a jug of boiling water or a spirit lamp, pulley and weight.

Let us take for illustration a fracture of the upper third of the femur.

The limb is washed and shaved and swabbed over with methylated spirit. No powder is used, as this will prevent the strapping from sticking. The strapping must be arranged so that the pull is from above the knee, for the joint below the seat of fracture should never be subjected to traction. Cut two strips of adhesive strapping, long enough to reach from the middle of the thigh to 3 inches beyond the foot, and 4 to 5 inches wide. At a point corresponding to 2 inches or more above the ankle, make snips from each side across the strips for one-third of their width. Below the snips, fold over the edges of the strapping so that the sticky surfaces are covered. This lower portion of the strapping then becomes a strap on each side, which will buckle on to the stirrup straps. The upper portions, after heating, are stuck on the sides of the leg, and held in position by pieces of strapping above the ankle, below the knee, and above the knee, and the whole is bandaged. The cord is fixed to the centre of the stirrup, and, passing over a pulley, supports a weight which varies from 10 to 20 pounds.

In order to prevent the patient from being pulled down the bed, **counter-extension** is applied by raising the foot of the bed, which throws the body of the patient against the weight.

Plaster of Paris is used for the splinting of fractures, and in mental nursing it may be the most efficient way of insuring the necessary rest for a broken bone. The nurse must know what articles are required and how to mix the plaster.

Requirements.—Plaster of Paris, which has been carefully dried before the fire; plaster bandages; domette or flannel bandages; linen bandages; two bowls; a large spoon; boric powder; gloves for the operator; and plenty of dust sheets for the bed and floor. Plaster of Paris bandages are prepared by sprinkling ordinary cotton or linen bandages with the dry powder and rubbing it in as they are rolled up. They are kept covered with the dry powder in well-sealed tin boxes until required for use.

Method.—The limb is shaved, dusted with boric powder, and a flannel bandage is put on—plaster of Paris is never put on to the bare skin. Just before the plaster of Paris bandages are used

they are stood upright in a bowl of warm water. Dry plaster may be rubbed in while applying the bandage, or plaster cream may be prepared as follows: Place warm water in a bowl, half as much as the quantity of cream required. Pour plaster on the water without stirring, until it floats on the surface and does not sink. Stir carefully until a thick smooth cream is produced. A pinch of salt added to the warm water will cause the cream to set more rapidly. Hot-water bottles placed around the limb help the plaster to set.

MASSAGE.

Massage is a word used to describe a number of manipulations carried out on a patient's body, muscles, joints, etc., by the hands of the nurse; to maintain the tone and nutrition of paralysed limbs; to soothe the pain in some neuralgias and nerve injuries; to reduce swellings, such as occur in fractures, dislocations, and sprains; to produce sleep, and relieve constipation. It is a highly skilled occupation, and proficiency can only be acquired by long study and practice. The hands of the nurse must be clean and dry. Dusting powder may be used, or sometimes an oil or vaseline as a lubricant.

The following movements are described:

Effleurage, or Stroking.—This term applies to the stroking movements of the hands, which may be light or firm. All massage should begin and end with effleurage. The stroking movements are made towards the heart —*i.e.*, upwards in the limbs—and are very useful in promoting circulation by assisting the venous return. This helps to reduce congestion in chronic inflammatory conditions or a sprain, and improves the nutrition of a limb during paralysis following nerve injury.

Pétrissage, or Kneading.—This movement consists in kneading and squeezing the muscles by gripping them firmly in the hands. They are rolled against the bones, and pulled gently in opposite directions.

Tapotement, or Tapping.—These movements convey a series of slight shocks to the tissues by tapping or pounding. This may be done in various ways—for example, the inner edge of the extended hand, the inner edge of the fist, or the hollowed hand may be clapped rapidly on the skin. If very rapid movements are required to produce a vibration effect, the pads of the finger-ends may be used.

Massage should not be continued for more than half an hour daily to begin with. This time may be extended as the patient gets used to it, and active or passive movements may be added to the massage.

PASSIVE MOVEMENTS.

Closely allied to the movements of massage are **passive movements,** so called because the movements of the joint under treatment are performed by the nurse without any assistance from the patient. These movements are of great assistance in the treatment of sprains, dislocations, and fractures. When passive movements can be made easily and without pain, the nurse will encourage the patient to begin to make **active movements**—*i.e.*, to move the joint by himself. Then commences a process of re-education, which only ceases with the complete restoration of function in the part. In this way much can be done for patients suffering from neuralgias, paralyses, contractions, disturbed gait, etc. These methods are of particular value in patients whose disabilities are functional in character—*i.e.*, not dependent upon bodily change.

The following is an illustration of treatment that can be given by any mental nurse for a case of sprained wrist:

Take the arm out of the sling, and place it on a table covered with a towel. Dust it lightly with powder. Perform light effleurage for ten minutes, always in the upward direction, first on the front, and then on the back of the wrist. This light effleurage should be repeated twice a day, until all effusion has disappeared. On the third day, gentle flexion and extension of the wrist should be tried, the movements being entirely passive —*i.e.*, performed by the nurse. When the wrist is less painful, pétrissage is commenced, which should extend to the muscles of the forearm. By this time active movement can be tried, the massage being continued twice daily until cure is complete.

OPERATIONS.

The nurse must know—

(1) How to prepare a room for an operation.
(2) How to prepare a patient for operation.
(3) How to nurse a patient after operation.

When there is no special operating theatre—and this may often occur in private practice—a small room should be selected

with a good light. A top light is a great advantage. All pictures, curtains, and superfluous furniture should be removed, and the carpet taken up from the floor. Next dust the walls and floor with a damp cloth. Then scrub everywhere, including the windows and door, with hot water and soap. Some washing soda should be put into the water used. Lastly, wipe the whole room with a 1 in 40 carbolic lotion or 1 in 200 formalin solution. Tables to be used should be treated in the same way. Where possible, it is advisable to prepare the room the day before the operation, and it should be left with windows and doors shut. If the operation is an urgent one, the room should be disturbed as little as possible, and a clean sheet put down over the carpet. This will avoid creating a dusty atmosphere. The temperature of the room should be 70° to 75° F. A kitchen table may be used as an operating table, but it must be strong. Four other tables must be available—one for the surgeon's instruments, one for the bowls and dressings, and one for the use of the anæsthetist. The fourth serves as a washstand, and is supplied with two washing bowls, soap, boiled nail brushes, towels, and hot and cold water. Two bowls should be provided for the lotions, two pails for dirty dressings or lotions, and a plentiful supply of hot water. Nearly every surgeon has a special preference in the matter of antiseptic lotions, and a supply should be made up of the required strength and kept ready labelled in jugs.

The operating table should be covered with a blanket, then a waterproof sheet, and a blanket over that. Two other warmed blankets must be in readiness, and two or three hot-water bottles, well covered. At no time must an uncovered bottle be placed near a patient under an anæsthetic or serious burns may result.

Saline solution is often required during operations, and a plentiful supply must be ready. Six per cent. glucose solution is often mixed with saline. Some surgeons replace saline with a solution of gum-acacia.

The Instruments.—These must be boiled for twenty minutes in a steriliser, for which a fish kettle will serve. A small lump of washing soda should be added to the water. Scalpels and needles should not be boiled, except under special instructions, as the edges and points get blunted. They may be dipped in a boiling steriliser, and then put in rectified spirit or 1 in 20 carbolic acid lotion. Instruments, after boiling, are lifted out on the tray of the steriliser or kettle and put in the lotion the surgeon requires.

They must not be touched by the nurse's hands. After the operation, the instruments are cleaned thoroughly with soap and water and a brush, taking great care of the joints, then boiled, wiped dry, polished with a dry soft cloth or leather, and put away.

The Dressings.—Two drums lined with towels will be required In the first, towels, overalls, and caps are placed. The second contains bandages, safety-pins, wool, white gauze cut in squares, and swabs. The drums are sterilised in the steam steriliser, under pressure, for twenty minutes. In private nursing the surgeons bring their own drums ready sterilised.

Gloves.—Rubber gloves are usually sterilised by boiling, and are then put in an antiseptic lotion, avoiding perchloride of mercury and carbolic acid lotion, as these injure the rubber. After use, they must be cleansed by holding them under a tap. They are then washed in soapy water, rinsed, boiled, and hung up to dry. Hands cannot be properly sterilised; gloves should be worn.

Sutures.—Remember that silkworm gut and silk may be boiled. Silkworm gut should then be put in spirit and silk in carbolic acid lotion. Catgut is usually supplied ready sterilised in glass tubes, the outside of which can be sterilised in an antiseptic before being broken.

To Prepare a Patient for Operation.—The day before the operation the patient is given a hot bath and light diet. At night 1 ounce of castor oil is administered. The whole area of skin to be exposed at the operation must be shaved carefully, removing if necessary the pubic hairs or the hairs in the axilla. The part is washed with soft soap, or ether soap and hot water, and dried thoroughly. The area is then painted with a 2 per cent. solution of iodine in rectified spirit and a sterile dressing applied. The iodine and dressing may be renewed in the morning. Some surgeons prefer an antiseptic compress—*e.g.*, 1 in 20 carbolic. The dressing must be firmly bandaged. A specimen of urine is obtained for the doctor. On the morning of the operation a simple enema is given, and a cup of tea and a little bread-and-butter may be allowed if the operation is not to be before eleven o'clock. An hour before the operation the patient is dressed in a flannel operating jacket and long woollen stockings reaching above the knees. A dressing gown can sometimes be worn. See that false teeth and hair-pins are removed. Lastly, five minutes before the operation, get the patient to empty the bladder. This is very important, and must never be forgotten.

Nursing after the Operation.—The bed must be ready to receive the patient on his return. Carefully protected hot-water bottles must be available, and a warmed blanket, which is placed over him before the sheet. Note the pulse-rate and the respiration rate.

Anæsthesia Complications.—Vomiting usually occurs, and the nurse must remain with the patient and prevent choking. A bowl and towel should be at hand. After an hour or two vomiting should cease. Its continuance must be reported to the doctor. No food is given, but sips of water may be allowed to relieve thirst.

When the patient has "come round," his position in bed may have to be altered. Abdominal cases should have a pillow under the knees, thus relaxing the abdominal wall. This pillow must remain until the stitches are out. The foot of the bed is often raised on blocks or chairs for cases that are collapsed and suffering from shock. Other cases may have to be placed in a sitting position to assist drainage (the Fowler position). Several pillows are placed behind the back and another under the knees. This last must be secured by pinning it to the mattress or slinging it to the head of the bed, to prevent the patient from slipping down. Bed cradles must be used for fracture cases, and for any patient who complains of the weight of the clothes.

Temperature and Pulse.—Both should be taken every four hours for a few days unless the patient is asleep, when he should not be disturbed. After the fourth day, night and morning will suffice.

Dressings.—Look at the dressings every half-hour for two hours after the operation, and then less frequently. Discharge or oozing of blood must be reported at once. If the patient complains of severe pain, it should be reported. It may be caused by too tight a bandage.

Urine.—The time of the first passage of urine must be noted, and the amount. If the patient does not pass urine for twelve hours after the operation the doctor must be informed.

Bowels.—An aperient is generally given the second night after the operation.

Diet.—After vomiting has subsided, weak tea may be given, or milk and soda. Directions as to diet must be carefully followed. The patient must be kept as quiet as possible, sleep encouraged, and insomnia reported. The doctor will attend to dressings of the wound. Stitches are usually removed on the eighth day. Dirty dressings must be burnt.

SIGNS OF DEATH.

In cases of long-continued illness, a fatal result may take place very rapidly. The nurse must be able to recognise the signs of approaching death in order that the doctor may be informed. The colour of the patient changes; his face becomes grey or mottled in appearance. A cold sweat breaks out on the forehead. Mucus collects in the throat, giving rise to the so-called "rattle." The character of the respiration alters, so that inspiration becomes irregular and sighing in character, or Cheyne-Stokes respiration may be present. The pulse falls steadily. Flies may congregate on the face, especially in wasted, enfeebled patients. Some patients become restless, give strange cries, and pluck at the bedclothes.

The nurse can do much to ease the last moments. The forehead can be wiped frequently, the lips moistened with water, and flies kept away. It may be necessary to place a gauze cover over the face of a patient very much worried by flies. The presence of pain in a dying patient should be reported to the doctor.

Do not forget to note carefully the religion of the patient, and attend to any duties it may involve. Do not let his relatives or friends trouble or disturb him. It is imperative to be extremely careful in conversation near patients who are *in extremis*. They are often conscious when nurse and friends believe them to be beyond hearing and understanding.

Sudden death sometimes occurs. The nurse's chief and urgent duty on these occasions is to send for a doctor.

The Signs of Death.—It is sometimes difficult to be sure that life is extinct. When there is any serious doubt a doctor should be asked to make an examination. The following simple tests can be applied by a nurse: (1) Hold a mirror before the mouth. A mist upon it indicates that respiration still continues. (2) Place the finger gently upon the cornea of the eye. The faintest movement of the eyelid indicates that life is not extinct. No reflex is obtainable after death has taken place. Death is accompanied by a marked colour change and by progressive cooling of the body, signs which are important. But difficult cases do occur, and a nurse must not hesitate to ask for medical advice.

Care of the Dead.—Immediately after death close the eyelids. When the friends have left, strip the bed, except for the upper

sheet. Remove instruments, oxygen cylinders, air pillows, hot bottles, etc. In a private house draw the blinds.

Straighten the limbs, remove false teeth, unless instructed to the contrary, apply a jaw bandage, not too tightly, tie the ankles and big toes together with a bandage. Leave a small pillow under the head. Wash the body all over, using plenty of soap. Plug the orifices with wool. The nails should be cleaned and cut. If an operation has taken place, a clean dressing should be applied.

Shaving may be necessary in private cases, and is easily done with a safety razor. Comb and brush the hair, and in the case of a woman plait it in two plaits, and tie it with white tape or ribbon. Dress in a clean gown, or whatever dress is desired. Socks for men, and stockings for women, are generally put on.

Place a clean under sheet and clean pillow-slip on the bed. Cover the body with a clean sheet as far as the chin; cover the face with a clean handkerchief.

Everything in the room must be made scrupulously neat, fresh, and tidy. In an institution the body is well screened, and removed at night from the ward to the mortuary; the patient's name is erased from the diet sheet, and medicines are returned to the dispensary. The exact hour of the death must be reported at once, and the names of persons present at the time handed to the responsible official.

Personal Effects.—These must be gathered up, a list made and handed to an official, or, in a private case, to a relative.

SECTION VI

BODILY DISEASES AND DISORDERS AND THEIR NURSING REQUIREMENTS

In this section certain general symptoms and signs of disease will first be described, and then some of the commoner forms of disease affecting the different organs, with general indications of the lines upon which these different diseases are nursed.

General Symptoms and Signs of Disease.

In good health we are not generally conscious of our bodily processes, unless we specially turn our attention to them; if we do so, it is usually with a feeling of pleasure. We enjoy the exercise of our muscles, the sense of fatigue if not too severe, the ensuing rest, the taking of food, and the quenching of thirst, On the other hand, when the body is out of order, we complain of various things. It may be only of discomfort or malaise; of actual pain; of feeling too hot or too cold; of nausea, faintness, weakness, and the like. These we call subjective symptoms of disease—*i.e.*, what the patient feels or complains of.

On examining the body in various ways, and comparing its state with what we know to be the normal or healthy condition, we may find various deviations from it such as tenderness, swelling, rise in temperature, alteration in the pulse-rate, redness or pallor of the skin, and so on. These we call the objective signs of disease—*i.e.*, what the observer finds on examination.

The earlier a disease is recognised and brought under treatment the greater are the chances of recovery; but there are many patients in a mental hospital who, for various reasons cannot, or do not, recognise or speak of their symptoms; and disease may only be detected by the intelligent observation of a nurse.

Any changes in a patient's appearance or habit of body should be noted and investigated and brought to the notice of the

medical attendant. A sympathetic understanding of the patients under his care, and constant observation of their habits, will enable a nurse to detect immediately when any of them are out of health.

When in doubt, the temperature and pulse and respiration rates should be recorded, and if any of the excreta are in question, a specimen must be kept for the inspection of the doctor; a mere description of it is unsatisfactory.

Pain is an indication that something is wrong. It is a purely subjective symptom, and it is necessary to be careful in forming an opinion as to its severity, etc., simply from the patient's description; his mental condition must be taken into consideration. A demented case may not complain of severe pain, while a nervous, irritable person will often make a great fuss over something quite trifling. Nor is the severity of the pain always an indication of the seriousness of the disease. For instance, a decayed tooth may cause great temporary suffering, while it is not uncommon for an abscess of the vermiform appendix to arise without causing any great discomfort at first.

The chief points to be noticed with regard to pain are:

(1) *Its Situation.*—Whether moving about or fixed in one spot. It does not necessarily follow that the place where the pain is felt is the seat of the disease, and an example of this is that the pain of hip-joint disease is often first felt in the knee.

(2) *Its Character.*—Whether throbbing, as in an abscess; or cutting, as in pleurisy; darting, as in neuralgia; or gnawing, as in rheumatism. It is usually best to let the patient describe it in his own words, and not to suggest terms.

(3) *Its Intensity.*—The nurse can form a good opinion of this by watching the patient.

(4) *How Intensified.*—Certain actions may make the pain worse, such as coughing in pleurisy; movement in rheumatism; taking of food in gastric ulcer, etc. On the other hand, certain actions may relieve the pain, such as pressing on the abdomen in colic. These actions must be carefully observed. Efforts to intensify or elicit pain by the nurse had better be avoided. They may do harm, and if they have to be made for the purpose of confirming a diagnosis, should be left to the discretion of the doctor.

It is necessary to remember that pain is often the starting-point of delusions.

Headache is a very common symptom of many minor ailments:

fatigue, indigestion, constipation, eyestrain, and so on; but it is also an early and prominent symptom of many serious illnesses. It is generally described according to the region of the head which is aching—frontal, vertical, occipital, parietal, or temporal. It should be noted also whether it is persistent or intermittent; whether it is limited to one side or symmetrical; or if it recurs at any particular period of the day.

Fever (Pyrexia).—A rise of temperature is a very common sign of disease and, speaking generally, its height is an indication of the severity of an acute condition. Very violent exercise may raise the temperature of the body, especially if the rapid radiation of heat is prevented by heavy clothing in hot weather; but in a healthy, vigorous person, the temperature adjusts itself very rapidly as soon as the exercise is stopped. A rise in the temperature of the body is therefore a most important sign.

In every attack of fever there are three well-marked stages: (1) The *invasion;* (2) the *acme* or height of the fever; (3) the *decline*.

The invasion may be sudden or gradual; if sudden, it is often accompanied by a shivering fit or *rigor*.

The decline usually corresponds in character with the invasion, and may be sudden (*crisis*) or gradual (*lysis*). During fever the frequency of the pulse and respiration increases, and, as a rule, the higher the temperature the greater the increase.

A feverish condition of the body is generally accompanied by other signs and symptoms, such as thirst, and loss of appetite. The tongue tends at first to become coated with a white fur, but later to become dry and brown; the bowels are usually confined; and the urine is diminished in quantity and high in colour. The skin is, as a rule, dry and burning. Headache is common, and there may be delirium, especially if the temperature is very high.

Rigor.—Many febrile conditions are ushered in by a shivering fit or rigor, and this is especially the case with some of the acute specific fevers and pneumonia. Rigors also occur with acute suppuration (abscess) and in malaria. A well-marked rigor sets in with a sensation of cold, especially down the spine, and is often accompanied with much depression and anxiety, the face looks pinched and blue, and the teeth chatter. This constitutes the cold stage of the rigor, so called because of the patient's sensation of cold, but if the temperature be taken in the mouth or rectum during this stage it will be found to be considerably

above normal. After some minutes the cold stage is succeeded by flushing of the face and general dilatation of the bloodvessels of the skin, and the patient then complains of feeling very hot. This constitutes the second or hot stage. Gradually the skin becomes moist, profuse perspiration sets in, and the temperature may become a little lower. In half an hour or so the sweating ceases and the rigor ends. It often leaves the patient much exhausted.

Thirst is usually present in all conditions in which the temperature is raised above the normal. It may also be due to the loss of much fluid by the system, and is therefore a constant symptom after severe hæmorrhage, in diarrhœa, and in diabetes. It also occurs in certain gastric disorders. The sensation of thirst is referred to the back of the throat, but is really caused by a deficiency of water in the blood. Thirst will usually be relieved by mild acid drinks, such as lemon and water. Generally speaking, the patient is permitted to alleviate his thirst in a high fever by drinking water, unless there are some reasons in the condition of the stomach or alimentary canal why this might be harmful.

Disturbance of appetite is a common symptom in all states of disease. There is usually impairment of the normal digestive processes during fever, due to the faulty secretion of the gastro-intestinal juices. During convalescence from debilitating disease the appetite is apt to be capricious, the patient appearing to be hungry and eager and fussy about his food, and yet unable to make a good meal. In some forms of indigestion there may be a very large appetite, or a craving for food at odd times, between meals, or in the night. In diabetes the appetite may be abnormally large. It must be borne in mind that refusal of food may be due to delusions.

Nausea.—The act of vomiting is usually preceded by a feeling of physical depression and disgust which we call nausea. The feeling may be accompanied by a flow of saliva—*salivation*. There may be nausea without vomiting, and vomiting may not be preceded by nausea; both facts are important, and must be noted.

Vomiting is usually a symptom of gastro-intestinal disorder, but it also occurs in other conditions, such as pregnancy, concussion, cerebral tumour, cerebral abscess, apoplexy, disease of the kidney (uræmia), or it may be caused by some horrible sight or offensive smell. It may be a hysterical manifestation.

It is a common symptom of the onset of the specific fevers—measles, scarlet fever, typhoid fever, smallpox, etc.

Bodily commotions, such as swinging, spinning, and, notoriously, those which occur on the sea, cause nausea and vomiting which are cerebral in origin.

Nausea and vomiting are accompanied by a rapid, feeble pulse, pallor, a lowering of the temperature, and clammy, cold extremities.

Loss of weight may be due to: (1) Errors in diet—*i.e.*, the food may be defective in quality or deficient in quantity; (2) derangement of the processes of digestion and assimilation; (3) excessive wear and tear of the body structure. It is constantly present in febrile diseases, and especially in phthisis, in cases of prolonged vomiting or diarrhœa, and in diabetes. Amongst the insane it is a marked symptom in excited and restless patients and in those who refuse their food, as well as in the later stage of general paralysis. When it occurs without obvious reason it is often due to early phthisis, and this is especially the case in patients suffering from chronic melancholia, dementia, or imbecility.

Anæmia is due to changes in the blood of the nature of (1) a reduction in the total amount of blood; (2) a reduction in the number of the blood corpuscles; (3) a reduction in the quantity of an important constituent such as hæmoglobin. It may result from defective production of new blood, loss of blood by hæmorrhage, or from prolonged debilitating illness. It is shown by persistent pallor of the skin and of the lips and gums and other mucous membranes.

Sleeplessness is likely to occur as the result of pain or high fever. It is a troublesome feature of many acute illnesses, such as pneumonia, rheumatic fever, heart disease, and the infectious fevers.

Inflammation is the reaction of the tissues to the attack of micro-organisms. It is accompanied by varying degrees of fever. It may be superficial—*i.e.*, on the surface of the body, or deep-seated in the organs. It may be localised, as in a boil or in an abscess of the appendix; or more widely spread, as in erysipelas or general peritonitis.

In the inflamed area there are *pain*, *heat*, *redness*, and *swelling*. The reaction begins with a dilatation of the bloodvessels of the part, which permits an increase in the rapidity of the flow of the blood—the concentration, as it were, of the advance guard of the defences of the body. This rapid flow of the blood is soon followed

by a retardation of the blood in the part. The watery elements of the blood are exuded into the tissues, and dilute the poisons of the micro-organisms. During this period the white blood corpuscles—the leucocytes—migrate from the bloodvessels, and by their living ferments counteract the poisons, and attack and absorb the micro-organisms and any dead tissue. These leucocytes may be looked upon as the first line of defence of the body; having assisted in the removal of dead tissues and the destruction of bacteria, they find their way back into the circulation through the lymphatics, and fresh tissue cells of the part carry on the repair. Those leucocytes which succumb to the poisons are discharged in the exudation from the inflammatory area as pus corpuscles.

The reaction of inflammation is Nature's method of limiting the advance of a harmful micro-organism and of repairing the damage done to the tissues. It may be briefly summarised as being a hyperæmia—an increased supply of blood, plus an exudation of fluid and a migration of leucocytes from the bloodvessels of the part. The increased supply of blood will reinforce the vitality of the tissues, and will dilute and remove the poisons of the micro-organisms. If the amount of the poisons be small, this may be sufficient, and the inflammation may begin and end with hyperæmia. Should this hyperæmia not be sufficient to deal with the bacteria and their poisons, the exudate will assist in throwing out from the body some of these poisons and the leucocytes which have succumbed, in the form of pus cells. In this latter case, we shall have suppuration, along with a certain amount of loss of tissue, in the form of ulceration, or, when more extensive, necrosis or gangrene.

The treatment of inflammation is: (1) To remove the cause if possible, and, in the case of small and readily accessible areas, this may be done by its complete removal or by treatment with a powerful antiseptic; (2) rest, which will allow the natural reaction to take place to the best advantage; (3) to assist the hyperæmia by the application of warmth—hot fomentations, cotton-wool dressings, etc. (probably also the best means of relieving the pain); (4) to remove the pus if there is suppuration, and cleanse by antiseptics.

Fainting (syncope) may be caused by any condition which interferes with the action of the heart or with the proper blood supply to the brain. The patient has a sensation of giddiness

or sinking; the face becomes pale and clammy, the lips blue, the pulse feeble or imperceptible, the respiration shallow and irregular; the vision becomes blurred, and consciousness is lost. The attack may last from a few moments up to some hours. The causes are numerous, but generally reflex, such as bad news, fear, tight clothing, indigestion, anæmia, hot rooms, unpleasant sights, sounds or smells. Sometimes it occurs in heart disease, and may then be serious. The treatment is to remove the cause if possible, to lay the patient flat, undo all tight bands to clothing, collars, stays, braces, etc., and to make certain that there is no choking. Although fainting is of the nature of a temporary functional disturbance which usually yields readily to treatment, and the immediate causes of which may be known, it is not always possible in trying to account for it to distinguish superficial from more serious conditions, and one can only be wise after the event.

By **shock** is meant a general and profound depression of all processes of the body, resulting from violent injury. Symptoms vary, according to the extent of the injury inflicted, from a mild faintness or giddiness, to sudden and complete prostration, unconsciousness, and even death. At first the pulse is weak and slow, but soon it becomes rapid, irregular, and difficult to find; the face is pale, shrunken, and covered with a cold sweat; respirations are slow and shallow, but there may be sighing, gasping, or yawning at intervals. The temperature is usually lowered. Degrees of shock will vary according to the severity of the injury and the violence which has caused it. A deep wound will produce more shock than a shallow one, but extensive superficial injuries, such as burns, involving the terminations of a large number of nerves, may also cause it in a very profound degree.

Internal injuries produce more profound shock than injuries to the limbs. The nervous condition of the patient at the time of the injury will also affect the degree of shock, sensitive and neurotic persons suffering more than the phlegmatic and less emotional. Should the injury involve loss of blood, the shock is likely to be greater, according to the amount lost.

Collapse is the name given to a condition similar to shock, but differing, usually, in that its onset is more gradual, and due to some exhausting disease, such as typhoid fever or cholera, and where exhaustion is associated with the loss of the fluids of the body, as in hæmorrhage, prolonged vomiting, or diarrhœa.

The *treatment* of shock and collapse consists in complete rest

and quiet in the recumbent position, warmth, and the administration of warm saline injections, either into the rectum, into the veins, or subcutaneously. Recovery from shock is shown by a restoration of the surface warmth, gradual return to normal in the rate and fulness of the pulse, deeper and quieter breathing and a resumption of consciousness and muscle power.

Coma is the term applied to an unconscious state produced by poisons, disease, or injury.

The patient appears to be sleeping soundly.

Coma varies in degree. It may be possible to rouse the patient for a few minutes, or unconsciousness may be absolute, with incontinence of urine and fæces. It may be associated with a certain amount of motor restlessness and delirium. The name **coma-vigil** is applied to a comatose state which is likely to occur in exhausting diseases such as typhoid fever, where the eyes remain open, and the patient may mutter incoherently in a low tone, while the unconsciousness may be profound.

Coma may be caused by certain drugs; it may result from shock or collapse, or injury to or disease of the brain, as in apoplectic seizure, when it is frequently accompanied by stertorous breathing. In diabetes or in uræmia, or in any exhausting disease, it may be the sign of approaching death. In nursing a comatose patient, particular attention will have to be paid to the bladder and rectum and to the prevention of bed sores. The comatose patient is particularly liable to be burnt by the careless use of hot-water bottles.

The patient may, or may not, be able to swallow, and this may be tested with a small teaspoonful of tepid water. Even if the patient can swallow, only liquid nourishment can be given, and this must be done cautiously. Only very small quantities at a time should be trickled into the mouth, and a second quantity should not be introduced until the first has been swallowed.

Diseases of the Skin.

The skin is subject to a large number of diseases, many of which are communicable. It is an excretory organ, and may show important changes in the course of diseases affecting the other organs and the blood.

Rash is the general name given to the changes in the colour and texture of the skin in many diseases.

The chief points to be noticed with regard to a rash are:

(1) Its *position;* where it began and how it spread; whether on the front or back or general; whether limited to one limb or side of the body or symmetrical—*i.e.*, the same on both sides of the body.

(2) Its *appearance;* whether in separate spots, circles, or irregular blotches; its *colour* (rosy, red, dusky); whether the colour disappears on gentle pressure, or whether there is actual discoloration or pigmentation.

(3) Its *character;* whether dry or moist, scaly or smooth, raised above the surface of the skin or not. A small, red, raised spot or pimple, which contains no fluid, is called a *papule;* such a spot may be surmounted by a small collection of clear lymph, and is then called a *vesicle*, or by a small collection of pus—a *pustule*. The cuticle may be raised in blisters or *blebs* containing clear lymph or pus, which are usually termed *bullæ*.

(4) The presence or absence of any *irritation* or *itching*, or heat or burning.

The commonest forms of *non-infectious* skin diseases are eczema, urticaria, herpes, and acne.

Eczema is an acute or chronic inflammation of the skin, characterised by more or less soreness and itching. The skin may be dry and scaly, or there may be profuse discharge of serum. Any form of irritation, whether in the blood or from without, may cause it. Thus, patients whose skin is allowed to remain in contact with urine are especially prone to eczema about the back and buttocks.

The *treatment* of eczema consists very largely in the application of various medicaments in the form of ointments. The disease may be very stubborn, and require prolonged and patient treatment for its complete cure, and as various skins react in very different ways to the drugs that are applied to them, the nurse should always be careful to obey explicitly the instructions with regard to their application.

In **urticaria,** or nettle rash, the skin is red and raised in wheals; the condition is often set up by some gastric disorder or by some particular article of diet, such as shell-fish. The use of certain drugs is also apt to produce it.

Treatment of urticaria is usually directed towards removing the cause of the trouble by restricting the diet and evacuating the bowel, and by the application of cooling lotions.

Herpes is the name given to a characteristic rash of vesicles, which sometimes makes its appearance over zones of the face or body corresponding to the distribution of a cutaneous nerve. Its cause is obscure, but it is probably due to an acute affection of the ganglia of the posterior nerve roots. The rash is usually on one side of the body, and the sites most commonly affected are: over the ribs, round the loins, the forehead and eyebrow, the genitals, the front of the thigh.

There is, as a rule, severe neuralgia in the part affected for some days before the rash makes its appearance. The rash consists of vesicles grouped on a raised reddened base. At first they are full of a clear fluid. In a day or two this becomes turbid, and the vesicles dry up and scale off.

A small herpetic eruption on the lips or nostril frequently accompanies the onset of pneumonia or typhoid fever, but this is also seen in milder affections, such as a common cold.

Treatment.—Soothing ointments or lotions are sometimes applied to relieve the pain. After the vesicles have made their appearance a soft sterilised dressing is applied, and the part is kept dry by a plentiful use of dusting powder.

Acne is an inflammatory disease of the skin which commences round the sebaceous glands. The duct of the gland first becomes blocked up, and the dirt collecting on this forms a small black point, commonly known as a "blackhead." This causes irritation, and a red, painful papule forms round it, which soon becomes a pustule; this eventually discharges a small amount of pus, and heals, leaving a little scar. Acne is most common in young people. The papules usually occur in crops, and the disease may last with varying severity for several years. The parts most affected are the face, especially the chin and the forehead, and the back. Patients who regularly take bromide of potassium are particularly liable to develop the disease, and this explains why epileptics so commonly suffer from it. As a preventative treatment the skin should be well scrubbed with a flannel and hot water and soap daily.

The rashes of the specific fevers will be described under their respective headings.

Among the commoner communicable skin diseases are scabies and ringworm.

Scabies is caused by a minute parasite which burrows under the skin, and the most common positions are between the fingers

and on the wrists. It causes intense itching, so that the patient is constantly scratching himself; the dirt thus introduced produces a rash on the arms and body, somewhat resembling eczema. Scabies is usually treated by the application of sulphur, either in the form of a lotion or in an ointment, after the skin has been softened and the burrows of the parasite laid bare by suitable warm baths. The clothing of a patient suffering from scabies may convey the parasite, and should be disinfected. Moderate degrees of heat, such as a hot iron, kill the parasite in the clothing.

Ringworm is caused by a minute fungus, which is especially prone to attack the scalp in children, producing circular bald patches showing a few broken hairs. It is commonly spread by children wearing each other's hats. The treatment consists of the application of antiseptic lotions and ointments. Cases are apt to be stubborn, and the treatment may have to be prolonged. Exposure of the affected parts to X rays is frequently employed.

Other common parasites of the skin are the body louse, head louse, and crab louse.

The **body louse** really inhabits and lays its eggs on the underclothing; a bath and change of clothing will get rid of them, and the eggs are readily destroyed in the clothing by passing it through a steam disinfector.

The **head louse.**—The application of carbolic oil or of paraffin oil to the scalp will kill the head louse and the eggs or "nits." These eggs are attached to the hairs of the scalp close to the roots by a cement-like substance which is insoluble in water. This cement-like substance may be dissolved by dilute acetic acid (vinegar), after which the "nits" may be washed and brushed out of the scalp.

The **crab louse** inhabits the pubes, and is sometimes found in the armpits and on the eyelashes; it is got rid of by the application of various antiseptic ointments.

A **boil** is a localised inflammation of the skin and subcutaneous tissue. It commences as a small red pimple in connection with a hair. There is considerable exudation of serum into the surrounding parts, and eventually a vesicle forms, which becomes pustular, bursts, and discharges pus. After a time a small slough separates, and the boil then heals. Boils rarely occur singly, and usually one follows another for several weeks. The pus from

boils contains a micro-organism, and hence care should be taken that the patient does not inoculate himself with it, and nurses should also be careful of their hands. The treatment is directed to the reduction of the inflammation by the application of warm fomentations, and to the evacuation of the pus by surgical means. In some cases, where there is a tendency to recurrence, a vaccine may be employed.

A **carbuncle** differs from a boil in the dusky red colour of the skin over it; in the large amount of slough it contains in proportion to the small amount of pus; in having numerous openings on the surface; and in its tendency to spread. The treatment is the same as that for boils, though it may be much more urgent.

Diseases of Muscles and Tendons.

The commonest disease of the muscles is muscular rheumatism, of which lumbago is a good example. It is characterised by continuous, dull, aching pain, much increased by movement.

Overstretching of either muscle or tendon by violent effort may produce strain or even rupture.

Muscular pain is generally treated by the application of heat, either by hot-water baths, or radiant heat and light baths, or fomentations, and by the use of massage and passive movements.

Weakness and **wasting** of muscle may be the result of disease of the nerve cells in the spinal cord which supply the muscles, as in the disease known as progressive muscular atrophy. Weakness and wasting of muscles may also be the result of disuse, as in a person who is confined to bed for any length of time, or where a limb has been kept motionless as the result of injury, such as a fracture of the bone or injury or disease of a joint.

Contractures.—Where one group of muscles around a joint is paralysed and loses its tone, the opposing group, not being antagonised, tend to shorten, and give rise to the deformities known as contractures.

Diseases of Bones and Joints.

Joints are especially prone to tuberculous disease, and are also commonly affected by rheumatism and gout.

Deformities of joints may be caused either by some alteration in the bones forming the joint, or in the synovial membranes

lining them. Irregular bony growths around the edges of the joint, and limiting its movements, are seen in chronic rheumatoid arthritis; and in chronic rheumatism the joints are often thickened and stiff owing to the changes in the synovial membranes.

Unnatural mobility of a joint may be the result of the relaxation of muscles and ligaments in states of debility, and in certain diseases, such as tuberculous disease, and in locomotor ataxia, from the absorption of the heads of the bones forming the joint (" Charcot's joint ").

A **dislocation** (see p. 131) is a displacement of one or more of the bones at a joint. The commonest joints to be injured are the shoulder, thumb, lower jaw, fingers, and elbow.

The *treatment* consists in the proper replacement of the bones in relation to one another, and their maintenance in such position until repair of the torn ligaments and capsule of the joint has taken place. And here again passive movements and massage are employed to prevent any subsequent stiffening.

Bones are subject to a variety of diseases, of which one only calls for mention here—namely, tuberculous disease. The symptoms of this are pain, swelling, and eventually the formation of an abscess. It is rarely associated with tuberculosis of the lungs or of the other organs.

Fractures of bone have been described in the Section on First Aid, p. 126.

Amongst the insane, those most liable to fractures are the aged and feeble, epileptics, and general paralytics. The commonest seats of fracture are the lower end of the radius, the neck of the femur, the collar-bone, and the ribs.

The *treatment* of fractures consists in the proper correction of the deformity in the broken bone, and its maintenance in a correct position at rest by properly applied splints.

While immobility of the bone at the seat of fracture is necessary for proper and rapid union, the danger of the wasting of muscle and of the stiffening of the joints from disuse is avoided by massage, electrical treatment, and early passive movement.

Diseases of the Circulatory System.

Diseases of the Arteries.—The arteries in health are elastic tubes which accommodate themselves to the quantity of blood passing through them, so that they are always kept full.

Arterio-sclerosis is the name given to a disease of the arteries, as the result of which they become thickened and lose their elasticity. In advanced stages there is degeneration of the arterial walls leading to weakening, and there may even be a deposit in them of calcareous matter—a condition known as **atheroma**—which renders them brittle. It is a process which occurs frequently with advancing age, and represents, as it were, the natural wear and tear to which the arteries have been subjected. It has been said that "a man is as old as his arteries." Arterio-sclerosis supervenes in early life as the result of overwork, continued over-indulgence in food and drink, or of syphilis or disease of the kidneys. The process may be general throughout the arteries of the body, or may be localised in the larger arteries, such as the aorta. Four main results may follow:

(1) The parts supplied with blood by the artery are imperfectly nourished, and consequently degenerate. This often occurs in the heart muscle. Arterio-sclerosis may be present in the bloodvessels of the brain even when the arteries elsewhere are not markedly affected. This may result in a progressive dementia accompanied by frequent convulsive seizures.

(2) The blood may clot in the artery (**thrombosis**) and completely stop the flow, resulting in local death (gangrene) of the parts supplied by that artery—a condition not uncommonly seen in the lower extremities of old people.

(3) The vessel-wall may bulge at one spot, giving rise to a swelling containing fluid blood, which pulsates with each heart-beat, and is known as **aneurism.** Sudden death may result if this bursts. The aorta and the larger arteries are chiefly affected.

(4) The artery, owing to some sudden strain, may rupture, and the blood may be pumped out into the surrounding tissues. This commonly occurs in the arteries of the brain, giving rise to the condition known as **apoplexy.**

One of the conditions named above—namely, **gangrene,** or mortification—calls for more detailed notice. The part affected, frequently the toes, becomes hard, black, and shrivelled, and, should the patient live long enough, eventually drops off. It is usually the seat of considerable pain. The disease may spread for some distance up the limb. The part should be carefully swathed in cotton-wool and protected by a cradle. If gangrene develops very quickly, the dead parts are moist instead of dry,

and are quickly invaded by putrefactive germs, giving rise to considerable fever, and, usually, death in a short time.

Reference may here be made to the **"insane ear" (hæmatoma auris).** This is a swelling which appears on the outer ear, due to effusion of blood or bloody fluid among the cartilages of the ear. It may become as large as a hen's egg, and is at first of a red or livid hue. If left to itself the swelling subsides after a time, but leaves the ear irregularly thickened, puckered, and much deformed. The condition is seen most frequently in general paralytics, epileptics, and cases of severe and long-continued excitement. The exciting cause is usually some violence to the ear. A blow, however light, or even the restless rubbing of the head on the pillow may cause it.

It is impossible in some cases to find any evidence of injury, and apparently it may arise spontaneously. It is important to observe it early, as by prompt blistering much of the deformity of the ear may be prevented.

Diseases of the Veins.—The veins have thinner walls than the arteries, and in certain parts are provided with folds of their lining membrane which act as valves, preventing backflow. Prolonged strain of any kind may cause bulging of the thin vessel-walls, so that the valves do not completely prevent a backward flow. The veins thus become dilated and tortuous, and are known as varicose veins.

Varicose veins are commonest in the legs, but are also met with in the rectum, or just outside the anus, where they are known as **piles,** or **hæmorrhoids.** Varicosities may also occur in the veins of the spermatic cord in the scrotum, and the swelling caused by them is known as a **varicocele.**

Treatment of varicose veins of the leg is generally directed to supporting them by some form of light elastic bandage, either elastic webbing or crêpe, applied from below upwards, while the patient is in a recumbent position, with the leg raised. These varicosities are often the cause of considerable irritation in the skin, and the consequent scratching may lead to a thickened, scaly, eczematous patch, which is frequently the starting-point of a **varicose ulcer.** Such ulcers may eat into the enlarged veins, and considerable, even fatal, hæmorrhage may result.

Varicose veins are especially liable to rupture from any slight injury, such as a kick. For this reason they are often removed by surgical operation in young and active people.

Varicocele, unless large, generally gives rise to no special inconvenience, but may cause a dull, dragging pain, especially if the patient is fatigued. This may be counteracted to some extent by the wearing of a suspensory bandage. It can be radically cured only by operation.

Hæmorrhoids, or piles, are aggravated by constipation, and there may be considerable loss of blood from those situated internally. External piles may give rise to much irritation, itching, burning, and pain.

The *treatment* of hæmorrhoids consists in the avoidance of constipation and strict attention to cleanliness; and when necessary, the application of soothing and astringent ointments. The practice of sponging the anus with cold water after every motion, by a person who suffers from piles, does much to avoid attacks of pain and itching, which are frequently so troublesome.

Diseases of the Heart.

Acute diseases of the heart almost invariably arise in association with the acute fevers. There are three chief forms: (1) **Endocarditis**—inflammation, primarily, of the lining membrane of the heart, especially the valves, and, secondarily, of the muscular walls; (2) **pericarditis**—inflammation which primarily affects the fibrous sac surrounding the heart, and, secondarily, the muscular walls; (3) **myocarditis,** which primarily attacks the muscle-walls. These acute conditions usually leave the heart affected in some way, and it is to the train of signs and symptoms which result that the common term of "heart disease" is applied.

When the valves are diseased, their edges become thickened and deformed, so that they obstruct the passage of blood, and, by imperfectly closing, allow of backward flow. Hence increased work is thrown on the muscular walls of the heart. The latter, following the usual custom of muscles, at first increase in thickness and strength (**hypertrophy**) to cope with the extra work. This increase in the heart's muscle may compensate for the disease of the valves for many years, and during this period symptoms of heart disease may be very few, for although the damage to the valves is usually permanent, it is not progressive except in the case of atheroma. Anything, however, which interferes with the general health or muscle tone of the body may interfere with this compensation. As the result of any debilitating illness, or with advancing age, the muscle may

commence to weaken and give way, the walls to stretch, and the cavities of the heart to dilate. The valves involved are almost always those on the left side of the heart. Heart disease primarily affecting the muscular walls is usually caused by atheroma of the arteries. The muscle-fibres become partially converted into fat, and hence lose their power, a condition known as **fatty degeneration.**

Causation of Heart Disease.—By far the commonest cause of valvular heart disease and pericarditis is rheumatism, especially rheumatic fever, and the younger the patient when attacked by rheumatism the more likely is the heart to be affected. Next to rheumatism, the commonest cause is one of the infective fevers—influenza, scarlet fever, pneumonia, smallpox, or syphilis. Lastly, excessive strain from over-exertion may bring about disease of the valves, the aortic valves being especially liable to be attacked in this way. Prolonged overwork is also liable to cause enlargement (hypertrophy) of the heart, in the same way as it causes enlargement of any other muscle, and eventually this may end in **dilatation.** Fatty disease of the walls of the heart is, as already mentioned, generally caused by disease of the arteries supplying the heart with blood. The heart also undergoes great enlargement in persons suffering from some forms of kidney disease (Bright's disease).

Signs and Symptoms.—The following are the commonest signs and symptoms of heart disease:

1. Palpitation.
2. Shortness of breath.
3. Flushing, cyanosis, or pallor of face.
4. Giddiness and fainting attacks (syncope).
5. Changes in the pulse-beat.
6. Swelling (œdema or dropsy) commencing in the feet and legs.
7. Cough, sometimes with expectoration of blood-stained fluid.
8. Disturbed sleep.
9. Pain in the region of the heart.
10. Digestive symptoms.

It is desirable to point out at once that heart disease cannot be diagnosed from symptoms alone, and that in other diseases, especially anæmia and indigestion, many of the above symptoms are present. A nurse must not, therefore, jump to the conclusion

that because a patient complains of some of the above symptoms heart disease is necessarily present; on the other hand, heart disease may exist for some time, and give rise to no symptoms whatever.

By **palpitation** is meant an irregular or forcible action of the heart, of which the patient is painfully aware. Apart from heart disease, it is common in nervous subjects and in those who suffer from indigestion. It is a pretty constant symptom in all forms of heart disease.

Shortness of breath is again a constant symptom, especially in those suffering from fatty degeneration of the walls of the heart and in those whose heart is dilated. It may occur in anæmia and in many other conditions where the heart is perfectly healthy.

Flushing, or the opposite condition, **pallor,** of the face is an unpleasant symptom in many cases of heart disease. **Cyanosis** is the name given to the red-blue, dusky colour of the skin, face, extremities, and of the mucous membranes, the result of faulty circulation, which is sometimes seen in advanced cases of heart disease.

Giddiness and fainting attacks (syncope) are often present in those who suffer from fatty heart, but are less common when the valves only are affected.

Changes in the Pulse-Beat.—The number of pulse-beats per minute may be increased or diminished; the beats may be *irregular,* by which is meant that they do not follow each other at regular intervals; or the pulse may be *intermittent—i.e.,* occasionally miss one or more beats. Irregularity is a more serious condition than intermittency.

Dropsy, or **œdema,** associated with heart disease, commences in the feet, and is often first noticed towards the end of the day or after prolonged standing. It is a frequent symptom in valvular disease, and in old people, when the heart muscle is beginning to lose its power. In valvular disease it is most common when the mitral valve is affected, and is then caused by obstruction to the onward flow of the blood. This obstruction, operating backwards through the lungs and the right side of the heart, affects the veins, and the pressure of the long column of blood is first felt in the feet and legs. When this flow in the veins is obstructed, the serum of the blood exudes through their walls, and gives rise to the œdema. It is necessary to point out that

œdema of the feet and ankles occurs in other conditions beside heart disease, especially anæmia and Bright's disease. But it is worthy of note that the œdema of the feet and ankles from heart disease frequently makes its first appearance in the evening, after the patient has been going about in the erect position. In a bed-ridden patient the œdema may be first noticed in the loins and buttocks. The œdema from Bright's disease may be noticed in the morning, after a night's rest.

Cough, with expectoration of blood-stained mucus, is caused by the inability of the pulmonary veins properly to empty themselves, which brings about a congestion of the lungs.

Disturbed sleep is a common symptom. Patients often start up from their sleep with the sensation of falling through the bed; they can generally sleep better when propped up with a bed-rest.

Pain is a variable symptom. It may be entirely absent, or only amount to a slight feeling of discomfort. It may be present in all degrees of intensity, and may be felt in the region of the heart, or in the left shoulder, radiating down the left arm. In some cases, especially in fatty heart, patients are suddenly seized with the most agonising pain (**angina**), and often die in one of these attacks.

Digestive symptoms, such as vomiting, diarrhœa, or jaundice, may be present.

Insanity is not particularly associated with heart disease, but people who have disease of the aortic valves are often very irritable, and, should they become insane, generally suffer from acute mania or agitated melancholia; suicidal impulses, too, are not uncommon in them.

Special Nursing.—Patients suffering from heart disease should be kept quiet and, if possible, should not be allowed to get excited. They should not be hurried when walking, etc., but given plenty of time, and this is especially important when going upstairs or up any incline or after meals. Sudden frights or shocks should always be avoided. They should be encouraged to eat their meals slowly, and should never be permitted to overload their stomachs. They should be kept under observation, and any symptoms suggesting aggravation of the disease, such as shortness of breath or swelling of the feet, should be noted and reported. In the later stages it is generally necessary to keep them in the recumbent position, either in bed or lying

on a couch. Some patients, when lying down, are more comfortable with the head and shoulders raised, but in fainting patients should lie flat, with the head low, and the clothes should be loosened about the neck and waist.

Diseases of the Respiratory System.

Diseases of the respiratory system are very common amongst the insane, and form a large proportion of the cases treated in the infirmary wards. It is therefore very desirable that nurses should have a proper knowledge of the more important symptoms so that, should any of these occur in a patient, they may be able at once to call the medical officer's attention to the fact, and also to nurse intelligently any cases which come under their care. It is proposed, first, to discuss generally the chief symptoms of respiratory disease, and afterwards to give a short account of those diseases most commonly met with.

Cough is a constant symptom in affections of the respiratory tract, and although it may occur in other conditions, such as hysteria and heart disease, or as the result of gastro-intestinal irritation, in the large majority of cases it is due to some trouble in the lungs or air-passages. The kind of cough varies in different diseases.

In pneumonia it is frequent but short, the characteristic "suppressed cough," the patient trying to restrain it on account of the pain.

In pleurisy it is painful, and usually there is no expectoration.

In acute bronchitis it is very frequent and distressing; at first it is dry, later it is easy, and attended with copious expectoration. It is generally worst in the morning, when the patient first wakes up.

In early phthisis it is short, dry, and hacking, but later becomes frequent, very distressing, and attended with expectoration.

A prolonged fit of coughing may end in vomiting, as so frequently happens in whooping-cough.

Expectoration.—The character of the sputum varies considerably in the different diseases. It may be viscid and frothy, when it is called "mucous," or mixed with yellowish streaks of pus, called "muco-purulent," or it may be thick, yellowish or greenish, and airless, when it is known as "purulent."

In pneumonia it is characteristic, being very viscid, generally clear, and "rusty" in colour. In some diseases it may be

streaked with blood. In gangrene of the lung it is dark in colour and very offensive, and it is also offensive in certain diseases of the bronchi (bronchiectasis).

Pain is a very marked symptom both in pneumonia and pleurisy. In these diseases it is described by the patient as sharp and stabbing, and is much accentuated by deep breathing and coughing. In acute bronchitis it is generally described as a feeling of " rawness " behind the sternum. Usually there is not much pain in phthisis, unless the pleura is extensively involved. In every condition in which the cough is frequent and distressing the patient complains of pain round the waist, from the constant jerking of the diaphragm and abdominal muscles.

The **rate of respiration** is increased in frequency in almost all respiratory diseases, and the normal ratio of four pulse-beats to each respiration is, as a rule, disturbed, the pulse-rate not being correspondingly raised. This is especially noticeable in pneumonia, where the respirations are often as high as fifty or sixty a minute. In phthisis and bronchitis the rate is also increased according to the severity of the disease, but not to the same extent as in pneumonia. Children always breathe more quickly than adults, and the pulse also is more frequent.

Changes in the Complexion.—When the disease of the lungs is very extensive and air cannot enter properly, the complexion assumes a dusky hue (cyanosis), due to the blood not being able to obtain sufficient oxygen. In asthma, a disease in which there is spasm of the smaller bronchial tubes which prevents the entry of air, this symptom is very marked, as it is also in some forms of bronchitis. In phthisis the face is usually pale, except for two bright red patches on the cheeks, constituting the well-known " hectic flush " of the disease.

High Temperature.—In all acute lung diseases the temperature is raised. In acute bronchitis and pleurisy it is moderate, not much above 102° F., and subsides with the disease. In chronic bronchitis the temperature, usually, is not raised. In pneumonia the temperature rises rapidly, often in a few hours, to as high as 104° F.; it generally remains high for seven days, and then falls rapidly (*crisis*) to normal or below. In phthisis the temperature rises each evening, sometimes as high as 104° F., and falls to normal or thereabout in the morning, constituting the " hectic " temperature. This same form of temperature may be seen in patients who have accumulations of pus in any

part of the body. Amongst the insane a rise of temperature is often the first indications of lung trouble, other symptoms being absent.

Sweating or Dryness of the Skin.—In phthisis a distressing symptom is the cold sweats which often occur in the early morning hours when the patient is asleep; they are spoken of as "night sweats," and they are very exhausting. They occasionally occur apart from phthisis when there is great debility. In pneumonia the skin is very dry and hot, and a similar condition is met with in scarlet fever. The crisis of pneumonia is often attended by profuse sweating.

Wasting takes place in almost all chronic lung diseases, but it is especially marked in phthisis, and the higher the temperature the more rapid is the loss of flesh. Old people affected with chronic bronchitis are similarly affected.

It is necessary to warn nurses that some of the above symptoms are not uncommonly absent in the insane even when the disease is well established; and this is particularly the case with cough and pain. The expectoration, too, is frequently swallowed, and hence may escape notice.

The more common respiratory diseases met with are bronchitis, broncho-pneumonia, pleurisy, asthma, and phthisis. For convenience of description, acute pneumonia will also be included, although by many authors it is now classed with the specific fevers. In describing these diseases it will be necessary again to refer to the various symptoms already mentioned, as they vary in severity and prominence in the different affections.

Bronchitis is an inflammation of the lining membranes of the bronchial tubes. It may be *acute*—*i.e.*, recent—or it may be of long standing, when it is spoken of as *chronic*. Children and old persons are particularly liable to be attacked. It is generally brought on by exposure to cold and damp air, and is a frequent complication of such diseases as influenza and measles. The chief symptoms of **acute bronchitis** are: (1) Rise of temperature to about 100° or 101° F.; (2) some difficulty in breathing; (3) soreness behind the sternum; (4) cough, at first dry and hard, and later attended by copious frothy mucous expectoration, which later still becomes yellowish and purulent, and is sometimes streaked with blood. Healthy adults generally recover in from one to two weeks, but if the attacks are frequent they are apt to lead on to the chronic form. In children and

old people it is not uncommonly fatal. The danger to life is greater when the smaller bronchi are attacked.

Chronic Bronchitis.—Bronchitis tends to recur, especially if the person's manner of life exposes him to climatic conditions. The disease at first generally makes its appearance in these patients in the colder months of the year, and disappears in the summer; but later the patient is affected all the year round. The chief symptom is cough, worse early in the morning, and there is usually abundant muco-purulent expectoration. In long-standing cases the lungs lose their elasticity and become distended (emphysema); there is then marked shortness of breath. The right side of the heart may dilate from the difficulty it experiences in pumping the blood through the lungs, and in old people this is a common cause of death.

Broncho-pneumonia is an inflammation of the terminal bronchi and their air-cells; it is probably caused by micro-organisms. It may be a primary disease, but is often secondary to bronchitis or one of the infectious fevers, especially measles or whooping-cough. It is much more common in children than in adults. The disease usually commences with a rigor, or, in children, with convulsions; the temperature rises rapidly to 104° F.; there is a painful, hard cough, and great difficulty in breathing, which shows itself by the bluish colour of the face. It is a very fatal disease in children, but adults as a rule recover, unless the disease should be tuberculous.

Pleurisy may be of two kinds: (1) Dry, the two surfaces of the pleura being inflamed and covered with exudation; or (2) there may be a large amount of serious effusion into the pleural cavity, compressing the lung and constituting **pleurisy with effusion**; if this should be on the left side, the heart is often displaced. The most marked symptom in the first variety is the sharp, stabbing pain, made worse by breathing or coughing; and in the second variety the difficulty of breathing, or **dyspnœa,** as it is called. The temperature in both varieties rises gradually, and may reach 103° F.; it subsides with the disease. Ordinary dry pleurisy is usually attributed to chill, but when there is effusion it is almost always tuberculous, unless due to injury. The serous effusion in debilitated subjects and in certain other conditions may become purulent, and the disease is then known as **empyema.**

Asthma is a nervous disorder marked by spasm of the smaller bronchi preventing the air from properly reaching the air-cells.

The attacks are recurrent, are frequent at night, and are characterised by great difficulty in breathing. Epileptic attacks are occasionally replaced by attacks of asthma.

Acute Pneumonia, or Inflammation of the Lungs, is now regarded as an infectious disease due to a special micro-organism. The disease commences suddenly, almost always with a **rigor** or convulsion, and the patient complains of headache and general pains. The temperature rises rapidly to 104° F. or even higher, and remains about this height until the **crisis** (which usually occurs from the seventh to the tenth day), when it falls rapidly. Pain in the side is very marked; there is a short " suppressed," painful cough, at first dry, but later attended with " rusty," very viscid sputum. Respiration is rapid, as is also the pulse. The patient has an anxious expression, and appears very ill; there is often an eruption (**herpes**) about the mouth. The crisis is attended by profuse sweating, and the patient almost immediately appears much better. **Delirium,** sometimes even acute maniacal excitement, may occur when the fever is at its height. Pneumonia is a very fatal disease, especially in alcoholics.

The nursing of pneumonia calls for great skill and experience, and it is well recognised that in this disease the nursing does more than medicine to promote recovery. The patient is usually kept lying flat, with one pillow, and may be clad in a loose, armless, " pneumonia jacket " fastened by tapes down the sides and over the shoulders so that it can be readily removed and adjusted. Light blankets and bed-coverings should be used while the temperature is high, and abundance of fresh air is of great importance.

Movements are painful and exhausting, and slight exertion may precipitate heart-failure. The patient should be kept quiet and his wants should be anticipated.

Food should be regularly administered every two hours by day, and every four hours by night, and the prescribed quantities should not be exceeded. Drinks to relieve thirst may be given in such quantities as the patient will take. The mouth should be attended to before and after every feed. The patient may be able to rinse out his mouth himself with some warm mouth-wash, but usually it is necessary for the nurse to cleanse it with wisps of cotton-wool held in a pair of forceps or wound round a piece of stick.

Sleep is of the greatest importance, and a pneumonia patient

should never be awakened for any treatment; but as he will seldom sleep for more than two hours at a time, a good nurse will have everything in readiness when he wakes and will keep up the regular administration of nourishment, medicines, or other treatment prescribed.

A blanket bath should be given morning and evening, when the patient should be sponged all over. The bathing operation should not last more than ten minutes. Sponging should also be carried out if the temperature reaches 104° F., and in this case should continue for twenty minutes. Hot (110° F.) rather than tepid water should be used, it is more comforting to the patient, and will bring the temperature down just as well. After drying carefully, the back should be rubbed with methylated spirit and dusted with powder.

When the crisis is likely to come, the patient must be carefully watched for the first signs of sweating. This may occur first over the chest, or, less often, on the forehead. Put on two blankets, hot-water bottles to the feet, and give hot drinks. When the patient has ceased to sweat, rub down quickly with a hot towel, put on a warm, dry shirt, and renew the sheets if necessary.

Tuberculous disease of the lungs (phthisis or consumption) is very common amongst the insane, and every year is responsible for a large number of deaths. Those suffering from mental weakness, either dementia or imbecility, are particularly prone to develop the disease. The cause of phthisis is a micro-organism —the tubercle bacillus. It may be inhaled, or it may be swallowed in infected meat or milk. Having once settled in any part of the body, and if not destroyed by the white blood corpuscles, it rapidly multiplies and sets up a process of ulceration, destroying the tissues around. Phthisis generally commences insidiously, but in some few cases the onset may be sudden, resembling an attack of broncho-pneumonia. Amongst the insane, often the first symptom noticed is that the patient is *losing flesh*, and does not take food well. If, then, the temperature be taken regularly, it will be found to be raised in the evening. Cough may be present, but in the early stages it is not so marked amongst the insane as in normal people; occasionally the patient may have an attack of *hæmorrhage from the lungs* (hæmoptysis). When the disease is well established the wasting is rapid, and the temperature is of the *hectic* type already described. The cough is

very troublesome, and attended with abundant muco-purulent expectoration, often streaked with blood. It must, however, be remembered that not uncommonly the insane swallow their expectoration. *Night sweats* are of frequent occurrence. Sometimes the patient complains of pain in the side. Towards the end of the disease diarrhœa often sets in, from infection of the intestines, and this still further exhausts the patient. With suitable surroundings and treatment the disease may often be checked; the temperature and weight are the best indications of the progress of the case.

Management and Treatment.—In this disease the principles of antisepsis must be rigidly applied. Segregation, or the collecting together of phthisical patients in special quarters, is usually necessary in institutions. The spread of infection occurs mainly through infectious material, such as sputum, discharges or excreta, which dries and reaches healthy patients in dust, or is more directly conveyed in clothing or feeding utensils.

The expired air of consumptives during cough contains small particles of infected mucus.

The duties of the nurse in this matter involve the disinfection of clothing, handkerchiefs, feeding utensils, spit cups, bed linen, and excreta. The prevention of the disease depends to a large extent on the efficiency with which these duties are carried out.

Consumption is best treated in the open air. Sunlight is known to have a direct preventive effect on the growth of the tubercle bacillus in the body. The patient lives day and night out of doors, protected from the elements by some shelter or hut or tent, and gets as much sunlight as possible. Sometimes the nursing is carried out on a veranda, or it may even be successfully performed in a room from which the windows have been removed, and through which ventilation is unimpeded. The patient is usually confined to bed if there is any fever, and exercise is strictly regulated according to the condition of the circulation. A rise in the pulse-rate will be a sure indication that the patient is doing too much.

Feeding is of the greatest importance. The diet is as liberal and fattening as the patient can possibly digest, and it may be necessary to prescribe tonics and cod-liver oil. The weight of the patient should be recorded at frequent intervals.

Pocket sputum flasks, to prevent the spread of infection, should be provided for patients who are able to get about.

Diseases and Disorders of the Digestive System.

Owing largely to faulty habits in eating, disorders of digestion are common amongst the insane; but actual disease is probably not more frequently met with than amongst sane persons.

Disorder of the digestive system gives rise to a group of symptoms commonly termed **indigestion** or **dyspepsia,** meaning thereby failure to digest the food properly. Very similar symptoms, more or less modified, occur in most diseases of the alimentary system. These symptoms of indigestion will be discussed in detail, and the modifications of them met with in one or two of the more common abdominal diseases will be pointed out.

The **mouth** is the beginning of the alimentary canal, and its mucous membranes take part in the changes which occur in alimentary disorders, and therefore give a useful indication of the condition of the stomach and the intestines.

The Teeth and Gums.—Owing to decayed and defective teeth proper mastication of the food may not be possible, and this is a fruitful cause of indigestion. It must not be forgotten, however, that although the teeth may be perfect, mastication may be slipshod and hurried, and bring about the same results. Pyorrhœa is a purulent infection of the gums around the teeth, and may be the cause of much ill-health from the absorption of septic material. This may sometimes be detected in the actual presence of pus round the teeth, and wherever the gums are spongy and bleed easily, it should be suspected. Sponginess and tenderness of the gums also occur in scurvy.

The Tongue.—The tongue may be large and indented at the edges by the teeth, and often coated with a thick white fur; or it may be small, red, and irritable-looking. The former condition is more common in ordinary dyspepsia, and the latter in diseases of the stomach. A bad taste in the mouth is often complained of, and may be the starting-point of delusions that the food is tampered with.

A white-coated tongue is a common sign in any minor derangement of health. If a person is on a liquid diet, and the tongue is not subjected to the scrubbing action of solid food during chewing, it may become coated with a white fur.

In exhausting diseases, such as pneumonia or typhoid fever, the tongue may become brown, dry, and cracked.

The **breath** may be very offensive. Apart from dyspepsia, it is a common condition in persons who neglect to brush their teeth. The breath has a distinctive odour in patients who refuse their food for lengthened periods.

Pain, varying in character, intensity, and position is a fairly constant symptom in diseases and disorders of the digestive system. In indigestion it is more a feeling of weight and oppression than actual pain, although in bad cases it may amount to the latter. The pain is usually referred to the region of the stomach, just behind the lower part of the sternum. It comes on a short time after a meal, and lasts for three or four hours. If the stomach be inflamed the pain is always severe. In **gastric ulcer** the pain is very severe and of a burning character; it is made much worse by taking food, and is felt behind, at a spot between the shoulders, as well as in front. In addition to the pain, there is generally marked tenderness over the painful area. In **cancer of the stomach** the pain may be very severe. When the intestines are the particular part affected, the pain is often of a griping or colicky nature; should this be caused only by irritating material present in the intestines, it may be relieved by pressure, but if by inflammation, pressure makes it worse.

Vomiting is not so constant a symptom as pain in the milder cases of indigestion, but is very marked in cancer and ulcer of the stomach. The character of the vomit varies. In ordinary indigestion it consists of the undigested food, sometimes mixed with bile. In cancer and ulcer it contains blood, sometimes in large quantities; in fact, it may be almost entirely blood. The blood brought up from the stomach is generally airless and dark in colour, and is often described as having the appearance of **coffee grounds.** Both in disorders and diseases of the stomach, vomiting, as a rule, relieves the pain. In obstruction of the intestines the vomit has special characteristics. It is generally brownish in colour and offensive in odour, from the presence of fæces. Hence it is known as fæcal or stercoraceous vomiting, and betokens a very serious condition.

Flatulence, by which is meant free gas in the stomach and intestines, is a marked symptom in indigestion. The gas is the result of decomposition and fermentation in imperfectly digested food.

Diarrhœa points to an irritation of the intestines, and is an effort of nature to get rid of the irritating material. It is not so

common a symptom in indigestion as the opposite condition, constipation. A form of spurious diarrhœa is not uncommon in people who suffer from constipation (in such cases the patient is constantly passing small, very liquid motions). It is caused by irritation of the intestines due to hard lumps of retained fæces, and is best relieved by an enema or a dose of castor oil. Sometimes blood is passed in the motions; if it comes from high up, it is almost black in colour, and has the appearance of tar (*melæna*); if from low down, near the rectum, it is bright red in colour, and is generally from piles. Diarrhœa is a feature of some of the infectious diseases, such as typhoid fever and dysentery, and then it will be necessary to take special precautions to disinfect the stools. This will be described later.

Constipation occurs in most cases of indigestion. It is very common in the insane, and gives rise to much trouble. It is frequently the exciting cause of fits in epileptics, or "seizures" in general paralytics, and not uncommonly is responsible for slight febrile attacks. Usually a symptom of indigestion, it may also be a cause. Nurses should always endeavour to satisfy themselves that patients' bowels act regularly. Constipation associated with vomiting, especially fæcal vomiting, points to obstruction of the intestines, and should be reported at once. On no account must an aperient be given in such a case.

Intestinal colic is a very painful form of intestinal indigestion, and the pain is caused by irregular and spasmodic contractions of the bowel. It may be a comparatively unimportant condition, such as frequently occurs in children after indiscreet indulgence in indigestible substances, such as unripe fruit. It may also be caused by flatulence and constipation, and it occurs as a symptom of lead-poisoning and in dysentery; or it may be the first indication of an attack of appendicitis or of strangulation of the bowel Its treatment consists generally in the application of warmth to the abdomen, and if the cause is known to be indigestible food, a dose of castor oil. It is safer, in the absence of definite knowledge of the cause, to relieve the bowels by means of an enema, and the diet should be limited to milk and water until the cause is known. In sudden severe abdominal pain give no food whatever.

Loss of flesh always occurs in patients who suffer for any length of time from disorders of the digestive system.

Other symptoms are *headache ; giddiness ; flushing of the face ; palpitation*, especially after meals; and, occasionally, *jaundice*.

Causation.—As indigestion is such a very common malady, and as it is often the precursor of other and more serious diseases, it will be well to enumerate some of the causes. In the majority of cases it is due to errors in diet. The food may be faulty in quality; certain articles, such as shell-fish, cheese, pastry, and new bread, are notoriously indigestible; or the quantity of food taken may be more than the stomach can digest. The food may be improperly masticated, and passed into the stomach in large lumps, which the gastric juice cannot dissolve. This may depend on faulty teeth, or on the habit some people have of bolting their food, a habit very common amongst the insane. Again, the food may be improperly cooked. It should be remembered that, speaking generally, boiled meats are more easily digested than roast meats. Over-indulgence in alcohol or tea, especially if the latter has been left too long in contact with the leaves, is a fruitful source of indigestion. Anxiety and mental worries also interfere with the proper digestion of food.

Management.—This largely resolves itself into a question of regulation of diet, and the nurse must see that the directions of the doctor are carefully carried out, both with regard to the quality and the quantity of the food taken. If patients cannot or will not properly masticate their food, it is advisable that they should have a minced diet. It is of great importance to pay attention to the bowels, for, as already stated, constipation may not only be a symptom, but also a cause, of indigestion. If the teeth are the source of the trouble, it is necessary to have defects in them remedied.

Jaundice is a condition in which the skin and mucous membranes are stained brownish-yellow by the colouring matter of the bile circulating in the blood. It is probably first and most easily noticed in the conjunctiva, which becomes lemon-yellow in colour. It may be caused by any obstruction to the normal flow of the bile from the liver into the intestines, by the blocking of the bile-duct by means of gall-stones, by inflammation of the duct or of the intestine around it, or by tumours. Bile pigment is found in the urine, the colour of which varies, according to the amount of bile pigment present, from dark brown to green. It may also be present in the perspiration. The stools, on the other hand, are white or clay-like, and very offensive in odour. The pigmentation of the skin may be accompanied by severe itching. There is a feeling of drowsiness and lassitude, and the

pulse is usually slow. In severe cases there may be mental disturbance, varying from irritability to delirium or coma. Treatment will vary according to the cause. In cases due to catarrh and inflammation of the intestinal mucous membrane, treatment will be directed to the cure of that, and the discoloration of the skin may remain even after the intestinal inflammation has passed off. Itching of the skin may be relieved by a warm bath.

Hernia.—By "hernia" is meant the protrusion of an organ from the cavity in which it is naturally contained through an accidental opening. The word is commonly used by itself to denote an escape of some part of the intestine or its appendages from the abdominal cavity, but there are other forms of hernia, such as hernia of the lungs, hernia of the brain, or internal hernia of the gut through an opening in the mesentery itself. In this section only hernia of the intestines from the cavity of the abdomen will be dealt with.

In some parts of the abdominal wall, especially in the region of the groin, there are weak spots, and under certain conditions, such as straining, a knuckle of intestine is liable to be forced through one of these, and to protrude under the skin as a roundish lump. It is usually quite small at first, not much larger than a nut, but in cases of long standing it may reach the size of an orange, or become even larger.

Symptoms.—Often, beyond a slight dragging sensation, the hernia gives rise to no marked symptoms. In some cases it quite disappears when the patient is in bed, and appears again on standing. It may happen that the knuckle of intestine becomes held and compressed by the sides of the narrow aperture through which it has escaped, and in consequence the blood supply is shut off and the hernia becomes strangulated. Urgent symptoms at once supervene, there is generally great pain in the part, and the patient is very restless. Signs of obstruction of the bowel appear. There is absolute constipation and constant vomiting, which may become fæcal.

Unless the condition can be relieved by prompt surgical operation it quickly proves fatal.

Management.—Patients should be carefully inspected when bathing and at other times, and any lumps about the groin should always be reported. Those known to have a hernia should not be allowed to undertake any work involving severe straining. A truss should always be worn; it should be put on

in the morning before the patient gets up, care being taken to see that the hernia is first reduced, and it should not be removed until the patient is in bed at night. The application of a truss to an unreduced hernia, or the wearing of a truss which does not prevent the hernia from coming down, is a source of danger. If possible, the bowels should be kept regular. The association of vomiting and constipation should always excite suspicion of strangulation in those suffering from hernia. *Aperients must not be given should strangulation occur.*

Intestinal obstruction is the term used to describe a condition in which the onward passage of fæces through the bowel is prevented. This may be due to many causes, such as the strangulation of a hernia of the gut, the impaction of foreign bodies, or inflammatory conditions in the abdomen.

The symptoms are sudden severe colicky pain in the abdomen, with signs of "shock," pallor, cold sweat, feeble pulse, and subnormal temperature.

The signs of shock may pass off in a few hours; pain in the abdomen persists and becomes continuous, there is vomiting, which may become fæcal. There is distension and great tenderness of the abdomen; the pulse becomes rapid, irregular, and feeble, the face drawn and anxious.

The temperature usually remains subnormal unless peritonitis supervenes, when it may rise. The lower bowel may empty itself at any time during the illness, but otherwise constipation is absolute, not even flatus (wind) being passed. *Purgatives must not be given.* Treatment is by surgical operation.

Peritonitis.—By peritonitis is meant inflammation of the lining membrane of the abdomen.

Causes.—(1) Extension of inflammation from, or perforation of, one of the organs contained in the abdomen; (2) wounds of the abdominal wall, such as stabs, bullet wounds, etc.; (3) infection by the tubercle bacillus—tuberculous peritonitis.

Peritonitis is a very fatal disease; the chief symptoms are: (1) Intense pain and tenderness over the abdomen, the patient usually lying on his back with the knees drawn up to relieve the tension of the abdominal wall; (2) swelling of the abdomen; (3) the temperature may be high, but in some cases it does not rise above normal; (4) constant vomiting; (5) the patient's face looks grey and pinched, lips cyanosed, eyes sunken, expression anxious. Treatment is usually by surgical operation.

Appendicitis.—By appendicitis is meant an inflammation of the vermiform appendix and of the peritoneum covering it. Though localised in the region of the appendix, a certain degree of diffuse peritonitis is almost necessarily a consequence. Infection of the appendix may occur at any time of life, in both sexes, but it is probably most common in young men.

Causes.—The causes of appendicitis are very obscure. The appendix is a relic or remnant which appears to have practically no value in the processes of intestinal digestion, and it is rather poorly supplied with blood. Repeated attacks of constipation and catarrh of the bowel may predispose to appendicitis.

Symptoms.—Sudden pain in the abdomen, which during the first twenty-four hours becomes localised in the right iliac fossa. Fever is usually present (rigor). There is nausea and vomiting; there may be constipation or diarrhœa, or a sharp attack of diarrhœa followed by constipation. The abdomen is rigid, sometimes the right leg is drawn up, there is tenderness on pressure on the abdomen, and the face is anxious and pinched. Treatment is usually by surgical operation.

The *management and nursing* of acute abdominal diseases call for the greatest skill and experience on the part of the nurse. Absolute rest and quietness are essential, and everything has to be done for the patient. Instructions with regard to the administration of food and medicine should be strictly adhered to.

Diseases and Disorders of the Urinary System.

The kidneys are situated at the back of the abdomen, opposite the ninth, tenth, and eleventh ribs, on each side. Their function is to extract from the blood certain waste and harmful products, the two most important being urea and uric acid. These products, dissolved in water also extracted from the blood, pass along two tubes, called the ureters, to the bladder, which is situated in the pelvis, and acts as a receptacle for the urine until it is to be passed.

Causes.—The commonest form of kidney disease is inflammation, which may be either acute or chronic; this is known as nephritis or Bright's disease, so named after the physician who first described it. It may depend on a chill, but more often is due to one of the specific fevers, especially scarlet fever and diphtheria. When the inflammation arises from these causes, it is acute in nature. Acute nephritis may result in permanent

damage to the kidneys, so that the symptoms become chronic. The kidneys may also be affected by tuberculosis, but this is generally secondary to tubercular disease in some other part of the body.

Symptoms.—Kidney disease manifests itself in two distinct groups of symptoms. The first consists of changes in the urine, and the second of general bodily symptoms. The normal quantity of urine passed in the twenty-four hours is about 50 ounces, but this varies somewhat, depending on the amount of fluid drunk and on the amount got rid of by the skin. If the quantity of urine passed is small, it is always dark in colour, as it is the water in which the solids are dissolved which varies, not the solids themselves. Conversely, if the amount of urine be large, it is pale in colour. In acute inflammation of the kidneys (acute Bright's disease) it is usually very scanty, and contains albumin and often blood. The appearance of urine containing blood varies according to the amount of blood present; if this be large, the urine may be almost black, like stout, but if the quantity of blood be small, the urine may only have a smoky appearance. Albumin is never found in health. Sometimes in acute Bright's disease no urine is formed by the kidneys, giving rise to the condition known as **suppression of urine.** This is very serious, and, unless relieved, quickly ends in death. In the more chronic forms of Bright's disease the urine varies much in quantity and quality; it generally contains albumin, but does not contain blood. Very large amounts may be passed, when it is always pale, or the amount may be diminished and may not exceed 10 to 20 ounces in the twenty-four hours. Besides blood and albumin, the urine may contain bile or pus. The former is present in the urine in cases of jaundice, and gives it a greenish-brown colour. Pus may be present when the kidneys or bladder are affected with tuberculosis, or when these organs contain a stone. It settles at the bottom of the urine as a creamy-white deposit. Sometimes even in health, when the urine is scanty, and has been allowed to stand and get cool, it will be noticed that it has become turbid, and the bottom of the vessel containing it is covered with a reddish deposit. This is a deposit of urates, and is due to the fact that the water, being scanty in amount, cannot, when cold, hold in solution all the solids passed. If the urine be heated, it will be found to clear again. Apart from kidney disease, the quantity of urine

passed is very large in cases of diabetes, and often also in cases of hysteria and nervous excitement. It is usually much diminished in quantity in all forms of fever. It is necessary here to refer to the condition known as **retention of urine.** By this is meant that the urine is retained in the bladder, and this organ in consequence becomes greatly distended. It must be carefully distinguished from suppression. Patients suffering from general paralysis often have retention of urine.

The general bodily symptoms of kidney disease are: (1) Dropsy, (2) changes in the sight, and (3) convulsions (uræmia).

Dropsy.—When the amount of urine formed by the kidneys is small or suppressed, the serum of the blood exudes into the cavities and tissues of the body, and gives rise to the condition known as dropsy. It generally first shows itself as a puffiness beneath the eyes, most noticeable in the early morning; whereas it will be remembered that in heart disease dropsy first appears about the feet and ankles after prolonged standing.

Eye Symptoms.—Patients who have kidney disease often suffer from dimness of sight, and should a patient complain of this, it must be at once reported, as it is often a premonitory symptom of uræmia. They are also liable to get small hæmorrhages into the back of the eyes (retina).

Convulsions (Uræmia).—When the kidneys are so diseased that they cannot perform their functions, poisonous products accumulate in the blood and produce convulsions, quickly passing into unconsciousness, coma, and death. To this condition the name of " uræmia " is given.

The heart and arteries are often affected in kidney disease. The heart becomes much enlarged, and the arteries become atheromatous (arterio-sclerosis).

Management.—It is important that patients with kidney disease should not suffer from chill, and they should always wear flannel. The diet, too, requires careful attention, and the orders of the doctor regarding this must be strictly obeyed. It is often desirable to keep a daily record of the amount of urine passed. If a specimen has to be saved for testing, it is usually taken from that passed early in the morning, and should be put aside in a proper urine glass with the patient's name attached. In cases of retention of urine it may be necessary to pass a catheter.

Reproductive System.

Hydrocele is the name given to any collection of fluid, other than pus or blood, in the neighbourhood of the testicle or spermatic cord. Such a collection of fluid may be congenital, or may be due to inflammation of the cord or testis, but only the common variety, which generally arises in middle-aged persons without any apparent cause, will be alluded to here.

It is especially common in the tropics. It appears as a rounded, pear-shaped swelling in the scrotum, varying in tension according to the amount of fluid present, and does not cause any pain unless the accumulation is very great, when its weight may cause a dragging pain. Its *management* consists in supporting the scrotum by a suspensory bandage.

The *radical cure* is effected by surgical operation.

Menstruation.—There are great variations in the menstrual functions of women, both in the time of its beginning, associated with puberty, and the time of its cessation, the **menopause,** or climacteric. Variations occur in the frequency, duration, and amount of the flow, and in the amount of malaise and physical depression or actual pain (dysmenorrhœa) at the menstrual periods. Any deviation from the usual habit in this respect should be noted and reported.

Cessation (amenorrhœa) is a frequent occurrence in all acute mental disorders. Re-establishment of the function is often one of the first indications of improvement in the patient's condition. After the menopause, any discharge, blood or mucus, should be noted and reported.

Some General Bodily Diseases.

Diabetes is a disease characterized by the presence of sugar in the blood, which is excreted in the urine (glycosuria). In a large proportion of the cases there is found to be disease of the pancreas.

The chief symptoms are great thirst, the passage of a very large amount of urine containing sugar, a voracious appetite, and progressive emaciation. In some cases the disease may go on for years, especially in older people; but in younger patients it is often quickly fatal.

Two complications of this disease to be remembered are: (1) Boils and carbuncles, which are extremely common; and

(2) **diabetic coma,** which may come on very suddenly, and generally proves fatal.

Diabetes is now treated by hypodermic injections of insulin. The important point in the nursing is to see that the prescribed diet is adhered to.

Tumour is the name given to any swelling in the body, but the word is more generally used to describe a "mass of new formation that tends to grow or persist without fulfilling any physiological function and with no typical termination." This will exclude all such swellings as inflammatory overgrowth which tends to end in scar formation, or hypertrophies of parts with increase in function. Tumours may occur in any organ or tissue, and may be simple (benign) or malignant.

Simple or **benign tumours** are usually limited and local in growth. They are generally enclosed in a capsule, and do not invade the surrounding tissues, which are simply pushed aside. When removed they do not recur.

Malignant tumours (cancer) are characterized by their tendency to invade and replace surrounding tissue, and are not limited by a capsule, except perhaps in the early stages. Some spread also along the lymphatics. The only treatment is removal, and as they are not clearly defined and their invisible elements may have spread along the lymphatics, they tend to recur. When near the skin malignant tumours generally break down and ulcerate. The growth of a malignant tumour causes pain, increasing anæmia, and general wasting and debility. The local symptoms are produced by interference with the function of the organ in which it grows; for example, a tumour of the brain may cause paralysis of a group or groups of muscles, or interference with one of the special senses. A tumour in the stomach will show itself by disorders of digestion, vomiting, hæmatemesis, etc.

The growth of a tumour does not give rise to pyrexia unless it may be from the septic infection of an ulcerating mass. The patient becomes thin and sallow, the face drawn with suffering. Unless successfully removed, malignant tumours are fatal.

Rheumatism in its **acute** form—**rheumatic fever**—is a non-contagious fever characterised by inflammation of the joints and fibrous tissues.

The cause is a micro-organism.

Young adults are most frequently affected, and it generally

occurs after a chill or exposure to cold or a wetting, especially after being overheated by work or exercise.

One attack predisposes to another.

As a rule the illness commences by a feeling of chilliness, not amounting to a rigor, pain in the joints, general discomfort, and very frequently tonsillitis. Within twenty-four hours the temperature rises to 102° to 104° F., and one or more of the joints become painful. In the majority of cases there is profuse sweating—the sweat being very acid and of a peculiar sour odour. There are the ordinary accompaniments of high fever—a rapid soft pulse, a furred white tongue, thirst, poor appetite, constipation, and scanty, highly coloured urine. The mind is clear unless there is hyperpyrexia.

The affected joints become hot, swollen, and red, and movement causes much pain. The wrists, elbows, ankles, and knees are the joints usually attacked, not all at the same time, but in succession, and one joint may improve, while the inflammation develops in another. The patient suffers acutely, as any movement in bed causes severe pain.

The **complications** which may arise in this disease are: acute diseases of the heart, pericarditis, endocarditis, myocarditis; hyperpyrexia (the fever may be very high and the consequent prostration very severe); delirium, convulsions, coma, chorea (St. Vitus's dance).

There may be skin rashes; one resembling scarlet fever is common.

Treatment.—The pain associated with the inflamed joints and the patient's inability to move call for much skilful and patient nursing. The patient should be in blankets to avoid chill, and the nightdress should be of flannel, open from neck to hem, and slit along the outer margin of the sleeves.

Milk diet is the most suitable, and the patient's thirst may be satisfied with lemonade or barley water.

The swollen joints are treated in various ways. They are generally wrapped in cotton-wool or in hot cloths saturated with carbonate of soda, to which has been added some analgesic, such as laudanum. Immobilization by splints may sometimes give relief to the patient, and cradles should be employed to support the weight of the bedclothes. Blistering or actual cauterisation of the skin over the joints is sometimes of use. Friction or massage cannot be borne.

The various drugs prescribed should be administered with great care, strictly according to orders. The sponging of the patient with warm water to which methylated spirit has been added should be carried out very carefully to avoid chill.

The anæmia caused by rheumatic fever is very marked. Convalescence is slow, and treatment should be prolonged after apparent recovery.

There is a **subacute** form of rheumatic fever in which the symptoms are not so severe, the temperature not so high (101° F.), the joints not so red, painful, and swollen. It is not uncommon in children, but although the symptoms appear to be milder, the heart complications may be just as severe and result in quite as much cardiac debility.

Chronic Rheumatism.—This is what we generally mean by the term "rheumatism."

It may follow an acute attack of rheumatic fever, but more often makes its appearance insidiously in middle-aged persons, particularly those who have followed arduous occupations entailing exposure to cold and damp. It is also closely associated with chronic septic conditions of the mouth and elsewhere.

The chief symptoms are stiffness and pain in the joints, which may be tender to touch and a little swollen from time to time, especially during bad weather. The skin over the joints is seldom reddened.

Many joints may be affected, but as a rule one particular joint is worse than the others; it may be a knee, a hip, or shoulder. The pain and stiffness are usually worse after rest; the joint may become more supple with use as the day advances.

The disease is not immediately dangerous to life, and does not yield much to treatment.

With advancing years there may be thickening and deformities of the bones about the joints, which may limit the movements, and there is generally well-marked wasting of the muscles of the affected limbs.

Treatment is generally directed to maintaining the general health at as high a standard as possible. The application of heat to the joint will relieve the local pain, and massage and passive movements will serve to reduce the swelling and prevent stiffness.

Dropsy is an excessive accumulation of fluid in the serous

cavities or lymph-spaces under the skin. Œdema is another name for dropsy, usually applied to the subcutaneous variety.

The swelling of œdema is distinguished from other swellings of the skin by the fact that if the finger be pressed on it, a depression forms which does not fill up for some time after the finger is removed. This is called "pitting on pressure." Other names are given according to the site of the accumulation of the fluid—*e.g.*, in the peritoneal cavity, ascites. These accumulations of fluid may be due to general or local causes. They may be caused by alteration in the composition of the blood itself, allowing abnormal exudation from the vessels, as in anæmia and starvation, or may result from interference with the normal circulation in diseases of the heart, kidneys, lungs, or liver.

The treatment of dropsy should be directed to the removal of the cause, and is generally combined with efforts to remove the excess of fluid by purgatives, by drugs which increase the flow of the urine or cause sweating. The fluid may be withdrawn from the body cavities by aspiration or tapping, or drained from the subcutaneous tissues by puncturing with needles.

In the management of a case with much dropsy, great care must be taken to prevent abrasions of the skin and the formation of bed sores.

Micro-Organisms and Infection.

Micro-organisms, which are also known as **microbes, germs,** and **bacteria,** are the lowest and simplest organisms at present known. By some they are regarded as vegetable, while others consider them to be too primitive for this. They consist of single cells, and are so minute that they can only be seen under a powerful microscope; some of them measure $\frac{1}{25000}$ inch in diameter. They multiply very rapidly: one divides into two, each of these again divides into two, and the process of division is repeated again and again, until in twenty-four hours one organism may have produced 20,000,000. Some kinds of bacteria form minute round bodies, called **spores,** which are capable of again developing into bacteria. These spores are much more difficult to kill than are the bacteria themselves. Many kinds of organisms do useful work; for example, the **yeasts** are the active agents in fermentation, the brewing of beer depending on their help. Other varieties, however, are responsible for most, perhaps all, diseases, although in some cases, notably in rheu-

matism and smallpox, we have not yet been able to isolate the particular organism. In such cases the bacteria are probably too small to be visible even under the microscope.

Most of the disease-bearing micro-organisms can be classified in three groups, according to their shapes: (*a*) **cocci,** which are round; (*b*) **bacilli,** which are straight rods; and (*c*) **spirilla,** which are curved or spiral rods. It must be understood that one particular variety of micro-organism causes one particular disease; for example, the typhoid bacillus is the actual cause of typhoid fever, and this disease is never caused by any other organism; diphtheria is caused by the diphtheria bacillus, and by no other; syphilis by a particular kind of spirillum; tubercular disease by the tubercle bacillus; and so forth. Certain cocci, called **staphylococci** and **streptococci,** cause abscesses, boils, erysipelas, septicæmia, pyæmia, and suppuration of wounds. They are the most common of the septic organisms, and it is principally against their attack that the surgeon has to take antiseptic precautions.

The Spread of Infectious Organisms.

All methods of prevention will depend, then, on some knowledge of the way in which they are spread. They may be **airborne.** Micro-organisms cannot live in absolutely pure air, but may be conveyed on the particles of dust or moisture in suspension in the air.

Infectious organisms may be **water-borne,** and may come to us in our drinking supply; so it is sometimes necessary to filter and boil water that is in danger of contamination. They may be conveyed in infected bedding, clothing, surgical instruments, surgical dressings; hence the necessity for the disinfection and sterilisation of such articles. They may be brought in food; hence the desirability of inspection of food supplies, care in its handling and transport, and destruction of harmful bacteria by suitable cooking. Milk is a substance in which micro-organisms grow with great rapidity, and contaminated milk is the means by which many diseases are spread.

Carriers.—Infectious micro-organisms are often spread by persons who are not suffering from the disease caused by them, and these people are called **carriers.** In this way may be spread such diseases as diphtheria, spotted fever, typhoid fever. Micro-organisms may be spread by insects:

the typhoid germ may be spread by the foot of a fly; the malarial parasite is carried in the salivary glands of a mosquito from an infected patient to a new host; plague may be spread in the same way by the flea; and typhus fever by the body louse.

Mode of Entry.—The infective bacteria enter the body in different ways. In typhoid fever and in dysentery they are swallowed in water and in food; in septicæmia and erysipelas they infect wounds of the skin or mucous membranes, which wounds may be mere scratches; in phthisis, whooping-cough, influenza, and smallpox they gain access in the inspired air. In some diseases (particularly in scarlet fever, smallpox, and diphtheria), clothes, bedding, books, etc., which have been used by the patient often contain the infective organisms. If such articles are put away without proper disinfection, they are capable of infecting a person who handles them months afterwards.

Location.—In different diseases the infective bacteria are found in different situations. In typhoid fever, for example, they pass from the body in the stools and urine; in scarlet fever they are in the skin and in the discharges from the nose and ears, possibly also in the urine; in smallpox, in the skin; in phthisis, in the expectoration; in dysentery, in the stools; in diphtheria, in the membrane which forms on the tonsils and palate. It follows, therefore, that in different diseases different methods have to be adopted to prevent infection from spreading.

Prevention.—One of the principal objects of medical and surgical work is to prevent infection by disease-bearing bacteria, or, if such infection has taken place, to get rid of the invading organisms. Important methods of prevention are: (1) Free ventilation, by means of which fresh and pure air sweeps out and replaces air containing infectious bacteria; (2) cleanliness, soap and water acting by washing away bacteria, and being also a useful antiseptic; (3) destruction or disinfection of infected bedding, clothes, etc.; (4) sterilisation of surgical instruments and dressings; (5) admission to living-rooms and bedrooms of sunlight, which kills most bacteria; (6) inoculation with vaccines, such as the lymph used to protect against smallpox. Examples of the methods used when infection has actually taken place are: (1) The use of antiseptics in surgical cases, these antiseptics killing the bacteria or at least preventing them from multiplying; (2) injection of antitoxins, which counteract the bacterial

poisons; (3) opening abscesses and draining away the pus with the organisms it contains; (4) the use of vaccines.

Immunity.—Before these organisms can produce their characteristic effects, the person to whom they are introduced must be susceptible, and this susceptibility varies very strikingly in individuals and in races. Immunity is the term applied to insusceptibility to disease. This immunity may be natural or it may be acquired. **Acquired immunity** may result from a previous attack of the disease, the cells of the body having produced something which is inimical to the growth of the micro-organism. For example, one attack of measles or scarlet fever or smallpox usually renders the person immune against another. This is sometimes brought about by **vaccination** with living organisms, which causes a mild and modified form of the disease, as in vaccination with cowpox, producing immunity against smallpox. This is called **active immunity,** inasmuch as the cells of the body have taken an active part in its production. It may also be brought about by the injection in suitable doses of dead organisms and their poisons in the form of a vaccine. A **vaccine** is prepared by making a culture of the organisms outside the body, killing them, and diluting the culture. This is the method employed in anti-typhoid inoculation. **Passive immunity** may be produced by the injection into the body of the **serum** of the blood of another animal which has been immunised against the disease; as, for example, antidiphtheritic and anti-tetanic sera. Passive immunity lasts a comparatively short time, and further doses of the serum are required. Active immunity, on the other hand, is generally much longer, and may last for the rest of life.

Diseases due to Micro-Organisms.

Tuberculosis is a disease caused by the invasion of the body by the tubercle bacillus. It is a widespread disease, not only among human beings, but amongst domestic animals. It may be localised in any organ or tissue or may be widespread throughout the body.

Amongst adults **pulmonary tuberculosis** (**phthisis** or **consumption**) is the commonest form, but amongst children tuberculous disease of the skin (lupus), lymphatic glands, peritoneum, bones, joints, and meninges of the brain, and general tuberculosis, are more frequently met with.

In the majority of these tuberculous lesions, surgical treatment is successfully employed, along with treatment in the open air, liberal feeding, and exposure to sunlight.

Syphilis is a specific contagious disease, caused by a micro-organism (a spirillum).

It is usually a venereal disease, infection occurring during sexual intercourse. It may, however, be spread in other ways, by contact with the discharges from a syphilitic sore.

The disease runs a more or less definite course, which may be described under four stages—viz., incubation period, primary, secondary, and tertiary stages.

The *incubation period* lasts from three to six weeks, during which there are no symptoms, and in this stage the disease is not communicable.

The *primary stage* is characterised by the appearance of a sore at the site of infection. The sore or chancre begins as a small pimple, which grows into a greyish-red sore, with a slight watery discharge. The edges have a punched-out appearance and are raised and hard. The lymphatic glands in the neighbourhood become hard and shotty, and may break down and ulcerate. The sore is sluggish, and may not yield to ordinary antiseptic treatment for months. It leaves a permanent scar. Under antisyphilitic treatment it generally disappears rapidly. In this stage the disease is communicable.

The *secondary stage* begins at from five to six weeks from the first appearance of the sore, and is characterised by general malaise, headache, and slight rise of temperature, which generally pass off with the appearance of a rosy rash on the skin of the body and limbs. The rash does not generally appear on the face. It does not itch, and at first it fades on pressure, but later becomes coppery and leaves a slight discoloration or " marbling " of the skin which may not fade for some weeks. There are other varieties of rash, which need not be described, but they are all symmetrical—*i.e.*, the same on both sides of the body, and tend to become coppery in colour. There is sore throat, with shallow, snail-track ulceration about the palate or pharynx and a general enlargement of the lymphatic glands of the body. Other symptoms may develop; the hair of the head may fall out in patches, and there may be inflammation of the ears, eyes, or bones. The nervous system may be seriously involved. In this stage the disease is communicable.

The *tertiary stage* begins about the third year or earlier, and in cases treated inadequately tertiary lesions may appear twenty years after the infection. In this stage the disease is not communicable, except by the actual discharge from an ulcerating lesion.

In this stage two diseases—dementia paralytica (general paralysis of the insane) and locomotor ataxia—may make their appearance.

Treatment.—As a rule the disease is very amenable to treatment, and if this is begun early in the primary stage, and carried on for a sufficient length of time, tertiary symptoms may never make their appearance. The remedy is mercury, and it is administered in different ways: in pill or tablet form by the mouth; by inunction of the body with mercurial ointment; by calomel vapour baths; or by intramuscular injections of mercurial compounds. The administration of mercury should be continued over a period of at least two years, during which the patient should regard himself as potentially contagious. Marriage is not advisable until at least two years after the disappearance of all symptoms under treatment. During the administration of the mercury the patient should lead a regular and sober life, avoid all chills, and pay particular attention to the hygiene of the mouth.

During recent years, there have been great advances in the treatment of syphilis, particularly in the earlier stages, by the use of injections of complex arsenical compounds, salvarsan (often called "606"), neo-salvarsan, etc. This treatment usually effects a rapid disappearance of the lesions and renders the patient less infectious.

Dysentery is, unfortunately, very common in some mental hospitals, and every year is responsible for many deaths. It is an acute infectious disease characterised by ulceration of the intestines, the large bowel being chiefly affected. The infection is given off in the stools, and may be communicated from one patient to another by dirty linen, bed-pans, and contaminated food.

Symptoms.—Sometimes the disease commences very suddenly with high temperature and diarrhœa, the motions containing large quantities of blood. In other cases the onset is more gradual, the patient complaining for two or three days of diarrhœa and slight fever. Blood and mucus then appear in

the motions, which continue to be very frequent. Often the stools are small, and may consist almost entirely of *mucus* tinged with blood. In favourable cases, after a week or so, the blood and mucus disappear, and the patient begins to pass shreds of the lining membrane of the intestines, loosened by the ulceration. These gradually become fewer and the attack ends.

In cases in which the diarrhœa continues, the temperature remains high, the outlook is grave, and the patient usually dies from exhaustion.

Dysentery is a disease very liable to recur, even after months or years, and therefore patients who have once been attacked should, if possible, be kept in a ward by themselves, or at least under special supervision. These relapses are often much milder than the original attack, and are very apt to escape the notice of the nurse unless the patient should complain. They are, however, equally infectious, and are often the starting-point of epidemics.

Management of Cases of Diarrhœa and Dysentery.—All cases of diarrhœa should be treated as if they were of an infectious nature. The patient should be kept apart, the stools disinfected, and the clothing sent to the laundry in separate bundles marked, "To be treated apart from the other articles of clothing and bed-linen."

Nurses should be particular in washing their hands, etc., after attending to these patients.

All vessels used by patients suffering from diarrhœa should be well rinsed out with the disinfecting solution ordered by the doctor. Vessels intended to receive motions should contain a small quantity of the solution, and each stool when passed should have poured over it double its bulk of the same solution. It is well, also, when water is used for the cleaning of the floors of the rooms, to add a proper proportion of the disinfecting solution to the water, and scrupulous attention should be paid to the cleaning and disinfection of water-closets (walls, floor, pans, etc.).

Influenza is an infectious disease, which makes its appearance in epidemics in different regions at irregular intervals. It may from time to time be pandemic, that is, it spreads with great rapidity from region to region, and affects large numbers of people, as in the years 1889-90 and 1917-18. It may occur at almost any time of the year, but is more prevalent in the colder months.

Its symptoms are many and varied, and may show themselves in all the systems of the body; they are, however, commonest in the respiratory system. It is caused by a micro-organism, and infection is conveyed from one person to another. The nasal and bronchial secretions of those suffering from the disease contain the organism in enormous numbers, which may remain after the patient has recovered from his illness (carrier).

After the invasion of the bacillus there is an incubation period of three to four days; the disease then makes its appearance suddenly, with fever, headache, vague " rheumatic " pains, and great malaise. The patient usually feels extremely ill. In the simpler varieties the disease takes the form of catarrh of the nasal and bronchial mucous membranes, with more prostration and debility than are associated with a common cold. In severe cases there may be hyperpyrexia and delirium, with bronchitis or pneumonia.

The course of the disease will depend on the severity of these complications. The bronchitis and pneumonia associated with influenza are frequently fatal, and in some epidemics the mortality is very high.

While the symptoms in the respiratory system are commonest, various other forms of influenza are met with, including the nervous form, in which the headache is very severe, and in which there may be other symptoms pointing to an inflammation of the meninges of the brain; and the gastro-intestinal form, where there is catarrh of the stomach and intestines, nausea, vomiting, abdominal pain, profuse diarrhœa, and collapse. In some epidemics jaundice has been a common symptom.

In all forms of the disease cardiac symptoms are common, such as persistent irregularity or rapidity of the pulse. It is also generally associated with some mental depression, and may be followed by attacks of melancholia or by progressive dementia. Even the mildest forms of the disease are characterised by an amount of prostration which appears to be out of proportion to the severity of the symptoms, and may result in a general enfeeblement of the health, which lasts for many years. It is often the exciting cause of mental disorder in those with hereditary predisposition.

Treatment.—Isolation of the patient should be adopted as far as possible to prevent the spread of infection; and secretions, nasal and bronchial, should be thoroughly disinfected. Even

mild forms should be taken seriously and treated in bed as far as possible, in a room of an equable temperature, great care being taken to avoid chills. Only in this way can the serious complications of the disease be minimised or avoided. Symptoms will be treated as they arise. If the fever is high and there is delirium, an ice cap may be applied to the head. Complications such as bronchitis or pneumonia will be treated in the usual way.

Careful feeding and the maintenance of the strength of the patient are of the greatest importance from the outset. The patient should remain in bed until all fever has subsided. Convalescence is usually tedious, and it may be a long time before the full strength is restored.

Erysipelas is an infectious inflammation of the lymphatics of the skin and sometimes of the mucous membranes. It is caused by the invasion of a micro-organism—a streptococcus—very closely allied to, if not identical with, the ordinary pus-forming streptococcus. The infection is particularly liable to occur in wounds and abrasions already septic, in alcoholics, or patients suffering from diabetes or albuminuria (Bright's disease). Apart from these predisposing causes, however, it seems that some people are specially susceptible to this infection, and may have repeated attacks. Again, there are others who have recurring attacks, usually at the same season of the year. In these cases the infection generally occurs in the unbroken skin of the face around the eyes or nose, and may be brought on simply by exposure to a cold wind.

The disease is ushered in by a slight chill or shivering fit, headache, and general discomfort (malaise), with slight rise of temperature. This is followed by the appearance of a bright rosy-red rash spreading (sometimes rapidly) from the margin of the wound or abrasion. The area of skin affected is not painful, there is usually only a sensation of stiffness or burning, its margin is slightly raised above the surrounding area, and the colour disappears on pressure at first, though as the rash spreads over new skin, the part first affected fades and a slight brown discoloration is left, and the skin is "branny." There is as a rule little swelling except over loose tissues, such as around the eyes, where there may be some œdema. Blebs and vesicles form on the surface, containing turbid serum, but suppuration is uncommon. There may, however, be gangrene and sloughing of skin.

While the rash lasts there may be continued high fever (104° F.); the pulse is generally quick, full, and bounding, and there may be much restlessness and delirium.

The disease may last from two to three weeks, and there may be relapses. Cases may be prolonged, with hyperpyrexia, great weakness and prostration, rapid feeble pulse, and low muttering delirium, and may end fatally.

Nursing and Treatment.—The patient and his nurse should be isolated to prevent the spread of infection, and all antiseptic precautions employed. Injections of antistreptococcic serum may be used.

Local treatment consists in various surgical measures to limit if possible the spread of the infection in the skin, and in the application of antiseptic solutions. The strength of the patient must be maintained by careful feeding, stimulants, and tonics.

Various symptoms, such as restlessness, sleeplessness, hyperpyrexia, demand attention and the most careful nursing as they arise.

Diseases of the Thyroid Gland.

Hypertrophy (enlargement) of the thyroid gland is known as **goitre** and is very common in certain districts, notably some of the valleys in the Alps. It may be met with, however, in any part of the world.

Simple enlargement of the gland may cause no general symptoms or inconvenience unless it is very large, when it may press on the windpipe or veins of the neck.

Besides the simple enlargement of the gland, it may be the site of tumours, either benign or malignant. There is, however, a disease associated with enlargement of the thyroid gland and an increase of its secretory function which causes much constitutional disturbance. This is called, from its most prominent signs, **exophthalmic goitre** (sometimes also called **Graves' disease**). It is characterised by *goitre* (enlargement of the gland), *exophthalmos* (protrusion of the eyes), *tachycardia* (rapid action of the heart), and *fine tremors* of the muscles. These are the prominent and constant signs of the disease, but in addition there may be slight fever, anæmia, and marked emaciation. Vomiting and diarrhœa may occur. The patient may complain of the violent throbbing of the arteries, profuse perspiration, and

sudden flushings. The skin may be irritable or itchy, and become pigmented and discoloured.

The mental condition changes, and patients become agitated, anxious, and apprehensive. In some cases mental symptoms are very pronounced, and there may be attacks of melancholia or mania, or alternating states of depression and exaltation.

The causes are very obscure. The disease may appear suddenly, following upon some emotional shock or some great worry, fright, or anxiety. The disease usually runs a long and chronic course, though some cases recover after six months or a year.

Symptoms are treated according to the urgency, and rest in bed in quiet surroundings will be beneficial.

Myxœdema is a constitutional affection due to loss of function of the thyroid gland.

The symptoms may appear early in infancy, and the condition is then known as **cretinism** (described in Section XIII.).

In adult life the symptoms make their appearance gradually. The body becomes bulky and heavy, the movements clumsy and slow. The skin becomes dry and harsh, and is firm and inelastic; it looks puffy, though it does not pit on pressure. The expression alters, the lines on the face disappear, the nose and lips become thick, and the patient looks dull and stupid. The complexion is sallow and dirty, though there are reddish patches over the cheeks and nose. The hair becomes sparse and coarse in texture; the nails split. There is constipation. Severe bleeding may follow minor injuries, such as the extraction of a tooth. The pulse is slow, the temperature is subnormal, and the patient feels the cold. Heart, lungs, and abdominal organs may present no signs of disease. There is marked mental deterioration. The intelligence is slow and the memory defective; there may be headache. Mental symptoms may be more pronounced, and there may be delusions and hallucinations, or even mania.

Treatment consists in the judicious and regulated administration of thyroid gland extract, and its results are very remarkable. The whole train of symptoms in the majority of cases rapidly disappears, and in a period of six weeks the patient may be restored to all his former bodily and mental health and vigour.

The Specific Fevers.

The specific fevers form a group of diseases which are distinguished by certain defined characteristics from other groups of diseases. First, they are **infectious**—*i.e.*, they can be communicated from one person to another; secondly, they are probably caused by certain special micro-organisms, every disease having its own micro-organism, and hence they are termed **specific;** thirdly, they run a well-defined course; and, fourthly, an attack confers immunity for a longer or shorter period from a second attack of the same disease. When large numbers of people are attacked at one time by one of these fevers, it is spoken of as an **epidemic;** occasionally, however, only isolated cases occur, and these are known as **sporadic** cases. Certain localities are never free from some particular form of infectious disease, and when this is the case the disease is said to be **endemic** in that particular neighbourhood. After the entrance of the micro-organism, a certain period elapses before any marked symptoms develop. This period is spoken of as the **incubation period.** It varies in length for the different fevers, and also, within certain limits, for each particular fever. During this time the organisms are developing in the body, and towards the end of it, the patient often complains of chilliness and not feeling well; he may have some headache and pains in his limbs; his appetite fails, and he generally sleeps badly. Following the incubation period comes the **invasion** or **onset.** This may be sudden, and attended with rigors and vomiting or, in children, with convulsions; or it may be gradual, so that it is difficult to fix the exact time the disease commences. The temperature is raised, headache is severe, appetite is lost, and there is often much prostration, in addition to the special symptoms of the particular fever. A rash is present in many of the specific fevers. This rash varies according to the nature of the disease, and is a valuable aid in distinguishing one fever from another. If the patient is going to recover, the severe symptoms, after lasting for a certain time, abate; the change may take place suddenly, when it is spoken of as a **crisis,** or the improvement may be gradual, when the disease is said to end by **lysis.** Following this comes the period of convalescence. The illness may be prolonged by various **complications** and **sequelæ,** and it is necessary that the nurse should be acquainted

with these in order that precautions may be taken to guard against them. A brief account will now be given of the more common infectious fevers.

Typhoid Fever.—This disease is most prevalent in the autumn months. Young people under the age of twenty-five are more liable to be attacked than older persons. Unless death should occur earlier, an attack lasts from four to six weeks. The micro-organisms generally gain entrance to the body by means of infected food—*e.g.*, oysters or watercress contaminated by sewage containing the germs—or they may be conveyed on the hands of a "carrier" or by the feet of flies, or in dust.

The *incubation period* is from seven to fourteen days, but may be prolonged to twenty-one days.

Symptoms.—Toward the end of the incubation period the patient complains of headache, lassitude, and loss of appetite. Nose-bleeding may also occur. The *onset* is gradual. During the first week the temperature slowly rises, until at the end it has reached 103° F. or higher, the headache is severe, and sleep is much disturbed. There may be some diarrhœa. In the second week the *rash* appears; it consists of small rose-coloured spots about the size of a millet-seed, and they are first seen on the abdomen, back, and thighs. Each spot lasts four or five days. They disappear on pressure. The temperature remains high; the tongue is coated, and sometimes dry and brown; the headache, however, disappears, but the patient is very dull and stupid; diarrhœa is often severe, the motions being like pea-soup —in some cases there may be constipation; the abdomen is generally distended. In the third week the temperature begins to fall, and should reach normal at the beginning of the fourth week; there is then marked prostration and loss of flesh. In the fourth week convalescence begins, the tongue cleans, appetite returns, and diarrhœa ceases. The rash usually disappears about this time. *Relapses* are not uncommon during the convalescing period. The poison of typhoid particularly attacks the intestines, and causes a number of small ulcers. The danger continues until these ulcers are healed.

Complications.—Towards the end of the second week profuse hæmorrhage may take place from the intestines, from one of the ulcers opening a bloodvessel. Later, an ulcer may perforate the intestines and set up peritonitis. Pneumonia and severe bronchitis are also liable to occur. During convalescence, clotting

of blood in the veins (thrombosis) is not uncommon. The mortality is usually about 20 per cent. of the persons attacked.

Nursing of Typhoid Fever Patients.—The infection of typhoid fever is given off from the body in the stools and urine. It is advisable, therefore, whenever possible, to mix both the urine and stools with sawdust and burn the whole; but if this cannot be done strong commercial carbolic acid should be added to the contents of the chamber and, after standing for some two or three hours, the chamber may be emptied down the water-closet. Night-stools and bed-pans should be thoroughly disinfected.

All soiled linen should be soaked in a 1 in 20 solution of carbolic acid and sent separately to the laundry. The nurse should always carefully wash her hands after attending to the patient. Typhoid fever is essentially a debilitating disease, and suitable nourishment is most important to keep up the patient's strength. The doctor's orders concerning the diet should be strictly obeyed, and on no account must anything be given that has not been ordered.

Scarlet Fever is a highly infectious disease, and is characterised by a diffuse red rash and sore throat. Children are more liable to be attacked than adults, and the disease is more prevalent in the autumn months.

The incubation period is short, usually from two to five days, and it may be only twenty-four hours.

The *invasion* is sudden, and is generally ushered in with rigors and vomiting or, in children, with convulsions. The temperature rises rapidly, and may quickly reach 104° F.; the skin is very dry, the pulse rapid, and the tongue furred. Sore throat is a very early symptom. The *eruption* appears on the second day, and consists of a large number of small red spots, which quickly join to form a diffused bright red rash; it is first seen on the chest and thighs, and soon spreads over the whole body, except the face, which is usually free. It lasts, as a rule, about three days, and then begins to fade. The tongue at first is red at the tip and sides, and furred in the centre; soon red spots show through the white fur, and give rise to the appearance known as the "strawberry" tongue. The throat may be merely red and inflamed, or there may be extensive ulceration. As the rash and temperature subside the skin begins to peel, and this usually lasts three weeks. Scarlet fever varies much in severity; some cases are very mild,

and the rash may be hardly noticeable; other cases may be so severe that the patient is killed by the poison before the rash has time to appear.

Complications.—The most common complications of scarlet fever are: (1) Acute inflammation of the kidneys—Bright's disease; (2) ear complications; (3) hæmorrhage from the throat; (4) inflammation of the joints. Bright's disease shows itself by a diminished quantity of urine being passed, which contains albumin and often blood. The urine should be examined daily.

Nursing Precautions.—The patient must be isolated in a well-ventilated room; care must be taken to protect him from chills, and the throat and ears need special attention. When desquamation, or peeling of the skin, commences, it is usual to rub the patient daily with an antiseptic oil. All shed skin should be swept up and burnt, as this is particularly liable to spread the infection. Discharges from the mouth and nose should be wiped away with lint or rag and burnt. All clothing should be soaked in 1 in 20 carbolic acid and sent to the disinfector. Spoons, cups, etc., should be disinfected with boiling water. The nurse should thoroughly bathe herself, wash her hair, and put on clean clothes, before mixing with other people. The infection of scarlet fever clings with great tenacity to clothing, etc. The patient is not free from infection until all peeling has ceased, and special attention must be paid to the hands and feet, where it lasts longest.

Measles is a very infectious disease, and, like scarlet fever, is most common in children.

The *incubation period* is from seven to twenty-one days.

The *invasion* is more gradual than in scarlet fever. The patient complains of slight headache, and seems to have a cold in his head. Running from the eyes and nose is always a prominent early symptom, and there is often a cough; the temperature is raised. The eruption appears on the fourth day, first on the forehead. It consists of reddish spots, which soon join and form crescentic patches. It is not so bright as scarlet fever, and is slightly raised above the surrounding skin. From the face it spreads all over the body, and lasts for about three or four days. As it subsides, there is peeling of the skin, which differs from that of scarlet fever in being very fine and "branny." During the height of the disease there is loss of appetite, furred

tongue, and headache. The general symptoms usually last a week, and then subside.

Complications.—Bronchitis and broncho-pneumonia are the chief complications to be feared, and the direct cause of death in the majority of cases in which the disease proves fatal.

Nursing Precautions.—It is most important to place the patient in a well-ventilated room, which should be kept at a temperature of from 60° to 65° F. He must be clothed in flannel and carefully protected from chills. The same precautions regarding the disinfection of clothing, etc., should be taken as in scarlet fever. The infection is chiefly given off in the secretions from the mouth and nose, in the breath, and, possibly, by the shed skin.

Smallpox is one of the most virulent of all infectious diseases and, in unvaccinated persons, one of the most fatal. It is characterised by an eruption, which is first a papule or pimple, then a vesicle or blister, and lastly a pustule or blister containing pus. The infection is given off in the breath of the patient, as well as by the contents of the pustules and the dried scabs.

The *incubation period* is usually twelve days. The *invasion* is sudden, and is characterised by rigors, intense headache, vomiting, pain in the back, and often delirium. The temperature rises very quickly.

The *eruption* appears on the fourth day, and is first seen on the forehead and back of the wrists. It consists of a number of very hard, "shotty" pimples, which soon become vesicles, and subsequently pustules. When the rash comes out, the temperature falls, but rises again later. In a mild case the pustules begin to dry up at the end of the second week, and convalescence commences.

Complications.—The complications of smallpox are numerous. Perhaps the most common is lung trouble, either bronchitis or pneumonia. Inflammation of the eyes is also likely to occur, unless great care is taken to keep them clean and free from the discharge from the pustules. Insanity sometimes follows an attack. The mortality in unvaccinated persons varies from 25 to 50 per cent., whilst in those properly vaccinated it is only about 1 to 2 per cent.

Nursing Precautions.—All persons who are brought into contact with smallpox patients should be immediately revaccinated The greatest care must be taken to prevent the spread of the

infection, and particular danger attaches to the dried scabs, which should always be burnt. Linen, etc., should be treated in the way described under scarlet fever.

Vaccination and Cowpox.—It is probable that cowpox is smallpox which has been modified by being passed through the cow. At the end of the eighteenth century Dr. Jenner observed that persons who had contracted cowpox were protected from smallpox, and about the year 1796 he commenced the practice of vaccination, which quickly spread to all parts of the civilised world. Since Jenner's day the power of vaccination to protect against smallpox has been abundantly proved. During the severe epidemic of smallpox which attacked London in 1901, there were employed at the smallpox hospitals 575 members of the staff, none of whom contracted smallpox. In the following year the number employed was 989, of whom one, a nurse, who was said to have previously suffered from smallpox, contracted the disease. At the ambulance stations about 130 members of the staff were employed each year, and only two coachmen (who carry patients to and from the ambulance) contracted very mild attacks of smallpox. All members of the staff at these hospitals are protected by vaccination.

Vaccination, to be efficient, should be done in at least four places, and revaccination is necessary after seven years. With ordinary care and cleanliness, no danger attaches to the operation.

Diphtheria is an infectious disease characterised by inflammation of a mucous surface, with the formation of a fibrinous membrane on the affected area, usually the throat. Children are more liable to be attacked than adults, and the disease often occurs in epidemic form.

The *incubation period* is from two to five days.

The *invasion* is not very acute. The patient complains of headache, chilliness, and pains in the limbs. The temperature rises to a moderate degree. In the majority of cases sore throat is early complained of, and the throat is found on examination to be red, with patches of greyish membrane on the tonsils. This membrane in a day or two spreads all over the throat, and often into the nose and larynx.

When the larynx is affected, there is a croupy cough and great difficulty in breathing and, in young children, death may occur from suffocation unless tracheotomy be performed. In severe cases there is great prostration; and the patient may die

from exhaustion apart from the throat condition, and this exhaustion is aggravated by the difficulty experienced in swallowing nourishment. There is no distinctive rash in diphtheria. Formerly it was a very fatal disease. Usually 40 to 50 per cent. of the children attacked died, but since the introduction of the **antitoxin** treatment the mortality has been greatly reduced.

Complications.—The most important and most common complication is paralysis, which usually comes on when convalescence is well advanced. The palate is the part generally affected, and when this is the case there is difficulty in swallowing fluids, which run back through the nose; the paralysis may also affect the eyes, fingers, and toes. Other complications are severe hæmorrhage from the throat, Bright's disease, endocarditis, and heart failure.

Nursing Precautions.—The infection of diphtheria is given off in the breath and in the discharges and membrane from the affected part. These discharges should be wiped away with lint or rag and immediately burnt. The nurse must not inhale a patient's breath, and must be particularly careful when the patient coughs, as particles of membrane may then be dislodged. The clothes, cups, spoons, etc., used by the patient must be treated in the way already described under scarlet fever. The urine must be frequently examined. The patient should be in a well-ventilated room, which must be kept at a temperature between 60° and 65° F. When the patient is threatened with suffocation by the membrane blocking up the larynx, it may be necessary to open the trachea below the obstruction, and to insert a tube for the patient to breathe through. This operation is known as **tracheotomy.** Great care must be taken to see that the tube does not become blocked. A supply of suitable feathers for cleaning it should always be at hand.

Common Parasites.

The chief internal parasites are the threadworm, the round worm, and the tapeworm.

Threadworms are commonly found in children. They are white and thread-like, from $\frac{1}{4}$ to $\frac{1}{2}$ inch long. They inhabit the rectum and great bowel, and are found in the fæces or around the anus. The signs and symptoms are irritability and restlessness, and intense irritation around the anus.

Round worms are more commonly found in children between the ages of three and ten years. They are round, cylindrical worms, pointed at both ends, about 4 to 12 inches long, of a yellowish or slightly reddish colour. They inhabit the upper part of the small intestine, and may find their way into the stomach. The symptoms are varied, and worms may not be suspected until they are seen either in the stools or the vomit. The commonest symptoms are restlessness and irritability, capricious appetite, grinding of the teeth, picking of the nose and squinting, and mild convulsive attacks.

Tapeworms are commoner in adults, and are usually derived from the eating of imperfectly cooked, infected beef or pork. They may also be spread by domestic animals, especially the dog. The head and neck are fine and thread-like, and the bulk of the worm is made up of segments. The whole may be as long as 20 feet. The symptoms are: Variable appetite, foul breath, furred tongue, anæmia and emaciation, twitching of the face, and dull headache. There may be a sense of movement in the intestines, which is increased by fasting and relieved by a full meal. Segments of the worms are seen in the stools or in the clothing.

The *treatment* for internal parasites involves the administration of various drugs (**vermifuges**) which assist in their evacuation, and it is usually carried out along with special dietary arrangements. It is important to remember when dealing with the tapeworm that all the evacuations must be carefully kept and searched for the head, which may be exceedingly small. Until this is found there can be no certainty that the parasite has been evacuated.

SECTION VII

ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM

The nervous system as seen in the higher animals, more particularly in man, did not arise suddenly complete, but grew through countless ages from very small beginnings to suit the constantly changing needs of the organism. Studied from this point of view, many of the difficulties of understanding its structure and functions will disappear.

By a gradual process of evolution, which we call **natural selection,** structures which are of especial use to the animal tend to become more fully developed, while those which are less useful tend to regress, or at least not to advance. A trifling superiority in some physical or mental quality may make the whole difference whether or not an animal escapes an early and violent death, whether or not it lives to propagate its species.

In the attempt to trace the development of these qualities it is probable that we have made many mistakes, and our present theories on the subject should be regarded only as stepping-stones to greater and more accurate knowledge.

In our description of the nervous system we shall give first of all a short sketch of the more important stages of its evolution, as seen in types of the animal kingdom from the lowest to the highest. Next we shall give an anatomical outline of the various structures found in the human nervous system; and lastly endeavour to place before the nurse in simple language our present conception of how the various parts act together to form a coherent whole. The countless combinations of function, as they progress from the more simple to the more complex place man in the end, through the possession of a large brain, in a position of complete superiority over all the rest of the animal kingdom.

At the beginning of our description we must ask the reader to realise once for all that although the nervous processes which

involve what we call consciousness, or mind, are those that most impress us in our daily life, and are continuous and innumerable, yet they constitute only a millionth part of the processes that are carried on without our knowledge or recognition, and must for ever remain outside our consciousness. Some few of the latter may, it is true, become recognisable in various states of health and disease when attention is specially directed to them, but the vast bulk cannot, in their very nature, be realised by us in daily life, and therefore there is a tendency to ignore their existence.

THE EVOLUTION OF THE NERVOUS SYSTEM IN ANIMALS.

As an example of one of the most primitive animals we may take the amœba (Fig. 1, p. 29). With the exception of the nucleus, whose activity is essential to the life of the cell, no part takes on any special task. The whole cell might be called its own "general labourer." Another single-celled animal, the vorticella, attaches itself to the weeds in ponds and ditches by a stalk (Fig. 77). A light touch on any part causes the stalk to contract and draw the body of the cell away from danger. This animal has fine, wavy hairs round one portion of it which is hollowed into a cup, and by the movement of those hairs tiny currents of water are created which waft particles of food within reach. These one-celled animals have nothing approaching a true nervous system, and the communication between one part of the cell and another is purely chemical. Even the higher animals have retained this mode in some of their lower functions, a good example being the production of secretin in the cells of the duodenum during digestion and its influence on the pancreas and liver.

FIG. 77. VORTICELLA. (Shipley and McBride.)

The next development in animals was the colony system, wherein multitudes of single-celled individuals, all having similar functions, grew in a mass—*e.g.*, sponges. But it soon became necessary that some means of communication between the different cells should be established. In sponges the introduction of a foreign body into the living, jelly-like tissue produces a move-

ment towards the foreign body of certain "wandering cells," which pass between the ordinary cells and gradually break up the foreign substance, discriminating between its harmful and beneficial elements. The message summoning them is conveyed by a chemical change in the cells in contact with the foreign body, and this slowly diffuses through the mass of cells. Thus a true reaction to environment occurs.

In the human body we find an example of wandering cells in the white blood corpuscles, which move out of the blood-vessels towards an injured part (see Inflammation, p. 228).

Even in lowly one-celled animals living as a colony we see a certain amount of difference in function between one individual and another, and this leads us directly to forms a little higher in the scale of life—animals made up of many cells differing widely in function.

FIG. 78.—HYDRA.

1, Ectoderm; 2, endoderm; 3, body cavity; 4, opening.

A good example of the kind is the fresh-water polyp (Hydra), a tiny creature, about $\frac{1}{4}$ inch long, which attaches itself by a sort of foot to weeds or stones, and in the adult form does not move from one place (Fig. 78). It has a body cavity which forms a sort of primitive intestine, one opening serving as mouth and anus. The body consists of two layers of cells, an outer (**ectoderm**) and an inner (**endoderm**). Between the two is a thin layer of transparent jelly, which after proper preparation shows under the microscope faint streaks joining ectoderm and endoderm cells. The sensory (ectodermal) cell receives a stimulus, and the motor (endodermal) cell responds with a contraction, so that the shape of the animal is altered, or food particles are sucked into or pushed out of the body cavity. This is the first indication of a nervous system, and is the simplest form of reflex action.

In the jellyfish (Medusa) we find a real nervous system with sensory nerve cells on the surface, and deeper nerve cells collected

into groups which are called "ganglia." All the ganglia have cross-connections with one another, and the jelly is contractile—is, in fact, a form of muscle. Careful examination reveals another form of specialisation in the sense cells on the surface. Some are sensitive to light only, some to touch, some to other forms of stimulus. Thus are the special senses of higher animals foreshadowed.

The next step in development is such a large one that it is not easy to find a sufficiently primitive creature of the type now living, and evidence must be gathered mostly from embryo forms of higher animals rather than from adults.

During the process of evolution the power of making rapid movement in one direction became more valuable than that of moving slowly in all directions. This led to several developments, especially to the concentration of special sense organs in the head, the growth of the animal in length by the gradual appearance of fresh segments between head and tail, and lastly, the development of limbs. These are so constructed that the animal can move rapidly forward, whether chasing prey or fleeing from an enemy. If a man is blindfolded and asked to walk, he puts out his arms, with fingers outstretched, so that anything in his way will first come into contact with the sensitive finger-tips. So nature, having taught her creatures to move forwards, endowed the foremost part, or head, with very sensitive organs. It was natural also that such organs should be situated round the mouth, into which all food was taken. The more primitive forms of animal life are able to realise danger only when they are in contact with it—when they are, so to speak, in the jaws of the enemy. Advantage lies with the organisms which can anticipate the danger afar off, realise an approaching enemy, or sight distant prey. Towards this end is the development of the special senses, such as sight, hearing, smell, taste. As might be expected, these senses were acquired only very slowly, as necessity arose, and an animal a little better endowed than its fellows escaped its enemies and secured more food. So, when the primitive animal began to crawl about in the mud at the bottom of the sea it developed new needs. It concentrated especially on growing a real intestine instead of a mere body cavity, and also a separate mouth and anus. This new intestine grew as hollow buds from the body cavity and developed along the back. There arose a great growth of body cells between the outer and

inner layers (**mesoderm**), which in the modern animal has given rise to the bulk of the body, fibrous and connective tissue of all kinds, and the bones and muscles. This growth of mesoderm left little of the original body cavity, but what remained has survived in our own pleural and peritoneal cavities. Now, with a dorsal intestine the animal had one little nerve mass or ganglion above and in front of the mouth (overmouth ganglion), and another little ganglion below and behind the mouth (undermouth ganglion), and these two were joined by arms or crura of nerve fibres encircling the œsophagus (Fig. 79). The ganglion above the mouth carried the sense organs and later became the brain, and the ganglion below the mouth was already divided into two portions, one **voluntary,** acting with the other ganglion or brain (devoted chiefly to voluntary actions such as

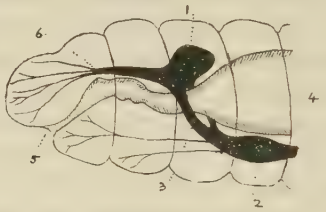


FIG. 79.—HEAD OF WORM. (Shipley and McBride.)
1, Overmouth ganglion; 2, undermouth ganglion; 3, crus cerebri; 4, œsophagus; 5, mouth; 6, snout-sense nerve

seizing and swallowing particles of food selected by the sense organs), and the other **involuntary,** devoted to the involuntary actions of digesting and of breathing. The reader must carefully note these remarks, for the overmouth ganglion with its sense organs, and the voluntary part of the undermouth ganglion with its nerve fibres to voluntary muscles, have become in the higher animal the **cerebro-spinal nervous system,** while the rest of the undermouth ganglion has become the **involuntary nervous system,** concerned with circulation, respiration, digestion, and reproduction. Note especially that from the first these two systems have been joined together and are mutually dependent, so that to-day practically every nerve in the body carries at one or other part of its course both voluntary and involuntary fibres, each of which may be either sensory or motor.

As the primitive animal grew in length it developed nerve ganglia in each new segment, and it was necessary that the whole

body should be directed by the specialised organs in the head. Thus we find nerve cords passing right along to the tail and connecting with each segment. This is the rudiment of a **spinal cord.**

We have now arrived at a sort of primitive worm type of animal, not so complicated as the modern earthworm, but not wholly unlike it, all the segments being joined by two thick nerve cords, so that the animal can move and act as an individual.

At the worm stage the animal kingdom became split up into two great groups.

In one group we still find a dorsal intestine and no backbone, and these are to-day what we call the great subkingdom of **Invertebrata.** The other group developed a backbone, and are to-day the subkingdom **Vertebrata.**

The vertebrate animal, endowed with the greater strength made possible by the bony spinal column, also gradually acquired a new intestine along the ventral part of the body, free from any encircling nerve mass, or crura round the œsophagus.

The reader will remember that this is the third kind of intestine which has made its appearance in the course of evolution. Its development appears to have been of great biological importance when we consider the state of things in some of the invertebrates.

Many of these creatures have reached a high state of specialised development. Ants and bees live a highly intelligent communal life. Though in the majority of instances their skill is instinctive and inherited, some of them, certainly the ants, learn quickly by experience. In the invertebrates the nerve ganglia above and below the mouth are connected by fibres, or crura, round the œsophagus, and in highly developed forms this whole nerve structure is fused into a large mass. But sooner or later a point is arrived at when, if by further growth of this brain mass the animal becomes more intelligent he will starve, and if he does not increase in intelligence he will be left behind in the race of life. Some spiders and scorpions have gone as far as they can, and their gullet has been reduced to a tiny tube, fit only for sucking blood.

In the vertebrates, what has become of the old dorsal intestine? It is now (1) the tiny central canal of our spinal cord; (2) at its front end the fourth and third ventricles of the brain stem; (3) in the brain itself, the lateral ventricles.

We can now picture a primitive vertebrate, although none such has survived even into geological times. It had a dim reflex consciousness of its surroundings as it crawled sluggishly about in the mud at the bottom of the river or sea. It could possibly, by a central eye, distinguish light from darkness; it could " sense " its food and suck it into its mouth. When seized by a more powerful enemy it might wriggle, but it died, probably, without feeling much alarm or pain. How do we know all this ? By considering the most primitive, degenerate vertebrates now living, especially the hag-fish or lamprey, and by examining early embryos of higher animals.

In the human embryo of a few weeks old or in a chick on the second day of incubation we already find a spinal cord, or " neural tube," as it is called, because it is still hollow, which at

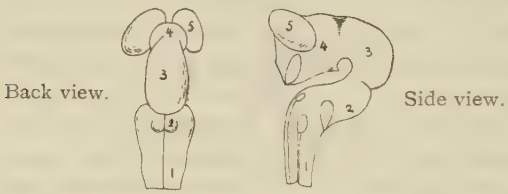


FIG. 80.—BRAIN OF HUMAN EMBRYO (SECOND WEEK).
1 Hindbrain; 2, cerebellum; 3, midbrain; 4, forebrain; 5, cerebral hemisphere.

the front end widens into three little hollow bulbs or " cerebral vesicles." We can identify these. The front one corresponds to the overmouth ganglion of the invertebrate, with the " snout-sense " organs protruding forwards; the middle one corresponds to the crura or arms round the obsolete intestine; and the hind one corresponds to the undermouth invertebrate ganglion. These vesicles are called forebrain, midbrain, and hindbrain, and the front end of the neural tube develops into what is called the brain stem (Fig. 80).

The **hindbrain** grows into the adult **medulla ;** it has retained the primitive involuntary functions of controlling respiration, circulation, and digestion. As, through the ages, the animal advanced in development, as it lengthened and acquired limbs, so the necessity for linking up the voluntary motor-nerve mechanisms in the medulla with its snout-sense in the forebrain was met by the development of nerve ganglia in the **midbrain.**

This became a centre for the reflex movements of body and snout-sense, and especially the now developing functions of sight and smell. Meanwhile the ear mechanism had been retained in the hindbrain, not used for what we call hearing, for the animal still led an underwater life, but used for balancing and for recognising its position in space. To help this function a thickened ridge arose on the dorsal surface of the hindbrain, and has now developed into the **cerebellum.** This " position sense " was also linked up with the midbrain, and in mammals we find here two sets of structures whose names must be remembered—namely, the **red nucleus** (so called because of its pinkish colour), and the **colliculi** (literally " little eminences "), an anterior and a posterior pair. These were at first more or less voluntary mechanisms, but now they are purely reflex. The midbrain in the human body is quite small, out of sight until the brain is cut into, entirely overshadowed by the enormous growth of the cerebrum, but in fishes, reptiles, and birds it may be as large as, or even larger than, the cerebral hemispheres.

Ages passed, the animal had emerged from the sea and breathed air by means of lungs. Sight, smell, taste, and hearing had become distinct; in the forebrain nerve ganglia were laid down and bodily sensation was extended to them. These have become the **thalamus**, the receiving centre for all sensation, both common and special, from body, limbs, ears, eyes, nose, and mouth.

With the development of the thalamus there arose a fresh arrangement of motor ganglia for voluntary movement, and so was formed the **striate body** in connection with it. From this, motor fibres run down through medulla and cord to the trunk and limbs. In the higher animals the thalamus and striate body are found at the lower part of the cerebrum, and are called the **basal ganglia.**

The animal also began to acquire **cerebral hemispheres.** These grew as hollow buds from the front corners of the forebrain, and in the course of development have become much larger than all the rest of the brain put together. The nerve cells which are arranged on the surface of these hemispheres are called the **cerebral cortex**, and have taken on all the voluntary functions of the nervous system, and provide the higher animals with more intelligent control of their activities. In fishes, reptiles, and birds the basal ganglia are still the seat of voluntary

movements, and these movements are to a large extent instinctive and automatic, rather than the result of conscious reason.

The first sense to be "corticalized" or connected up with the new cerebral cortex was smell, and in such lower animals as live practically by smell, there is not much else in the way of sense organs connected up to the cerebral hemispheres. These animals have very large olfactory lobes. An animal's special senses may be very acute, but if they are only imperfectly

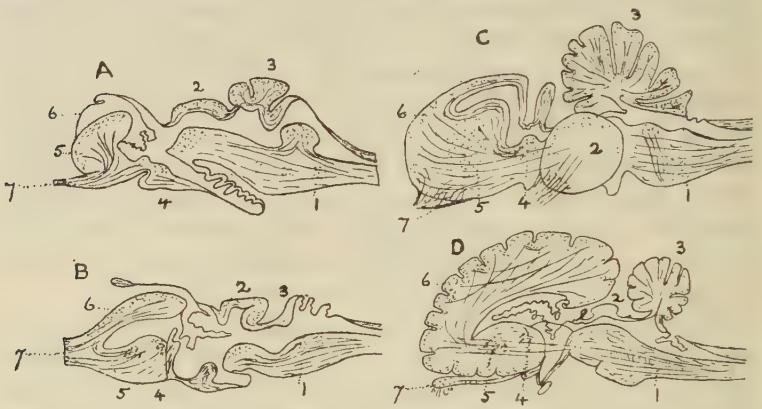


FIG. 81.—SCHEME OF THE EVOLUTION OF VERTEBRATE BRAINS. (After Edinger.)

A, Fish; B, reptile; C, bird; D, mammal. 1, Hindbrain (medulla); 2, midbrain; 3, cerebellum; 4, thalamus; 5, striate body; 6, cerebral cortex; 7, olfactory bulb.

connected up with a cerebral cortex, it may fail to make an intelligent use of them.

We can distinguish between the "reflex use" of a special sense and its "intelligent use," which is cortical. For example, a pike in an aquarium tank will knock his head for three months against the glass partition which prevents him from reaching the defenceless minnow in the next compartment before he learns to desist. If the partition is then removed he will sulk in the corner for another three months before he realises its absence. He can *see* the glass all right, but cannot learn by experience that water and glass are different; his sight is reflex rather than cortical.

A hen may take two days to learn the way into and out of a new fowl-house or to recognise her own chickens. In the case

of sheep and cattle, the most accurate discrimination of nutritious and poisonous foods that they are capable of lies in their sense of smell, for the "intelligent" nose is linked up to the instinctive memories of the other senses, but in what we call reason they are most "stupid." Even the intelligent dog, which can recognise thousands of his companions by smell, is at a loss if his master puts on a new coat and he is not near enough to smell him.

Only in the higher mammals are all the senses and all the details of movement, whose centres lie at lower levels, linked up to the brain cortex; and in man alone another system of speeding up nerve action has been fully developed. This is the association with one another by direct connecting tracts in the cerebral cortex itself of all the cortical centres representing sensation and movement.

We shall refer to this further when we come to consider the cerebral cortex in detail.

We may now summarise the parts of the adult brain developed from each of the three cerebral vesicles of the embryo:

Hindbrain: Medulla, cerebellum.

Midbrain: Red nucleus, anterior and posterior colliculi.

Forebrain: Retina of eye, thalamus, striate body, cerebral hemispheres.

THE ANATOMY OF THE NERVOUS SYSTEM.

Like all tissues of the body, nervous tissue consists of cells, and these cells are called "neurons." Each neuron has a long fibre going from it, the "axon," and these make up an appreciable part of the bulk of the nervous system. Also, as in most other tissues, there are bloodvessels and a complete network of lymphatics.

Cell Elements.—The **neuron** consists of a body called the **nerve cell,** from which arise, like the roots and branches of a tree, numbers of long and delicate processes. The whole neuron may be looked upon as a piece of electrical apparatus of which the nerve cell is the battery, and the processes are the wires for the conduction of messages. The cerebrum alone contains millions of these complicated cells. The nerve cell contains in its centre a round body termed the **nucleus,** which is essential to the life of the cell.

The processes or conducting fibres of the neuron are of two kinds: (*a*) the dendrites. (*b*) the axons. The **dendrites** branch into fine twigs, and spread in all directions round the cell, collecting

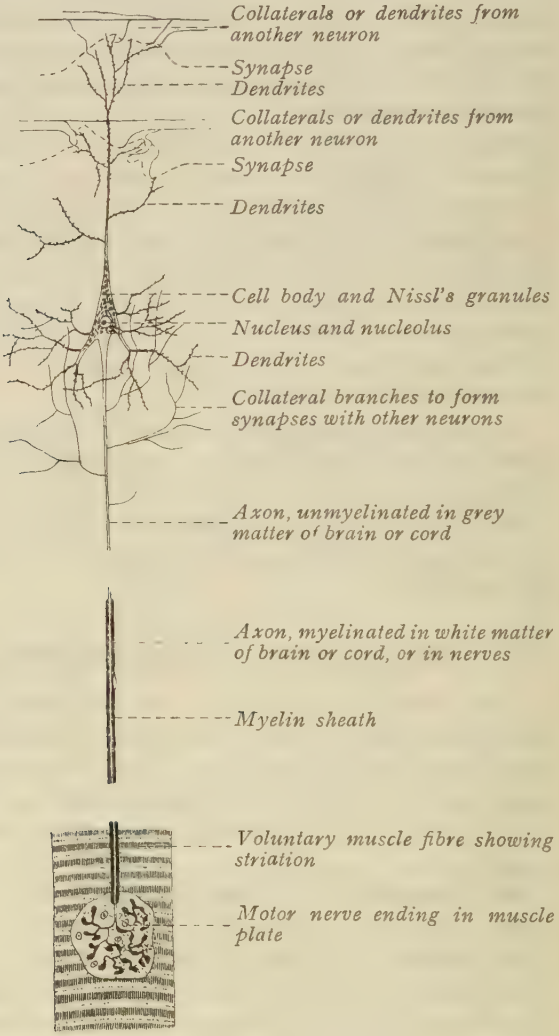

Collaterals or dendrites from another neuron
Synapse
Dendrites
Collaterals or dendrites from another neuron
Synapse
Dendrites
Cell body and Nissl's granules
Nucleus and nucleolus
Dendrites
Collateral branches to form synapses with other neurons
Axon, unmyelinated in grey matter of brain or cord
Axon, myelinated in white matter of brain or cord, or in nerves
Myelin sheath
Voluntary muscle fibre showing striation
Motor nerve ending in muscle plate

FIG 82.—DIAGRAM OF A MOTOR NEURON

or transmitting impulses from the dendrites of neighbouring neurons. The spot at which the dendrites of one neuron come very close to, or possibly in some instances actually touch,

the dendrites of another neuron is called the **synapse** (literally "clasping"). These synapses are of great importance, for it depends on the amount of chemical change going on there whether the spread of the nerve energy is prohibited or whether it is allowed to pass from one neuron or system of neurons to another. It is possible that the ability to sleep depends on the conditions existing at the synapses.

The **axon** is a process which is often inches, and even feet, in length. The axon transmits impulses to or from distant parts. Nerve fibres are composed of the axons of nerve cells, and some of these are of great length. The muscles of the sole of the foot are influenced by the axons of nerve cells which lie in the spinal cord at the level of the loin, and the skin of the sole of the foot is supplied by the ends of axons which extend from nerve cells in a ganglion outside the spinal cord, lying at the same level. The axon is surrounded by a **myelin sheath,** and this is either connected with the growth of the fibre or, more probably, prevents the leakage of the nervous impulse travelling along the fibre, just as the rubber coating of an electric wire keeps the current in its proper channel.

When an area in the brain or spinal cord in which these cells are massed together in large numbers is cut across, it has a pinkish-grey appearance, and is called **grey matter.** In the grey matter the axons have no myelin sheath, and are said to be **unmyelinated.** The rest of the brain and spinal cord, consisting of the **myelinated** axons of the nerve cells, is pearly white on section, and is called the **white matter.**

The neuron possesses in a special degree the character of irritability, and reacts to a very small stimulus. It has also developed the property of conducting a stimulus from one part of the cell to another at a speed which has been estimated at something like 120 yards per second. Every nerve cell may be looked upon as the centre which feeds the fibres which proceed from it, and if any fibre is cut across the portion which is separated from the cell inevitably dies. The cell also supplies the energy for all nervous processes, and is readily susceptible to fatigue or injury. Cells and fibres are bound together by connective tissue which, in the large nerves, is tough and fibrous, but in the grey matter of the brain and spinal cord is jelly-like, and is therefore called **neuroglia.** This neuroglia, so far as known, takes no part in the creation or conduction

of nerve energy. In some diseases, such as general paralysis, it is greatly increased in amount.

The **nerve fibres** in the nervous system are classified according to the general functions they perform. A nerve fibre which carries the impulse from the cord or brain to the body is known as a motor or **efferent** fibre. On the other hand, a nerve fibre which carries a sensation from the body to the cord and brain is called a sensory or **afferent** fibre. The great majority of neurons and their fibres, however, lie wholly within the central nervous system, and as their function is the connecting up of various other systems of neurons, they are called **connector** or **association** neurons.

In some tissues of the body we get neurons so modified as to have lost their original structure. Examples are the heat and cold spots and the touch corpuscles of the skin, the retina of the eyeball, and the motor plates on a muscle fibre. All the neurons of the nervous system are present at birth, although many of them are small and not fully developed. Development takes place largely during the early months of life, and it is said that the brain doubles in size during the first nine months. From this time onward its development is more gradual until the age of sixteen is reached, after which period there is little or no increase in its size. In the case of an animal such as the guinea-pig, which runs about and performs voluntary movements as soon as born, the motor neurons are fully developed at birth.

There is no regeneration of neurons. We have our full complement of them at birth, and once a neuron is destroyed it cannot be replaced. In some tissues the cells multiply when necessary—for example, the new bone cells formed in the repair of damaged bone. Neurons, however, cannot multiply. Once a nerve cell is destroyed the function it subserves is lost, and if large numbers are destroyed there is a likelihood of some permanent disability remaining. In many cases in which the disability appears to diminish in the course of time, this apparent recovery is due to other neurons becoming gradually educated to take on the function of those that have been destroyed.

Nature cares for the brain in a remarkable way, and during starvation, although there is considerable loss of weight in other parts of the body, the brain retains its weight at the expense of the other organs.

For the purpose of description we may divide the nervous

system into its two great parts (1) the cerebro-spinal system, (2) the involuntary system. It is of the utmost importance to remember that all parts of both systems are absolutely continuous, although described separately, and any description of one part cannot be read or understood completely without reference to the fibres from all the other portions described which pass through or to or from it, like different railway companies which have running powers for their carriages over other lines.

I. THE CEREBRO-SPINAL SYSTEM.

We describe the various parts as (1) brain; (2) spinal cord; and (3) peripheral nerves.

1. The Brain.

The **brain,** or **encephalon,** lies in the cranial cavity. Bone is developed round it, largely by way of protection, and it is also covered by two layers of connective tissue, or membranes, called the **meninges.** The outer membrane is tough and fibrous, and is called the **dura mater,** and the inner is delicate and film-like, and is called the **piarachnoid.** Inflammation of these meninges is known as meningitis.

In the dense dura mater lie the various venous sinuses which return the blood from the brain to the internal jugular vein, and so down the neck back to the heart. The **arteries** to the brain are the **internal carotids** and the **vertebrals.** These form a circle, the **circle** of **Willis,** at the base of the brain, and from this three pairs of arteries enter the brain—the **anterior, middle,** and **posterior cerebrals.** These have numerous branches. Apoplexy or cerebral hæmorrhage is most frequently caused by rupture of one of the branches of the middle cerebral artery, and a hemiplegia, or paralysis of one side of the body, occurs when the escaping blood ploughs up the area known as the internal capsule, which will be described later.

Both brain and spinal cord are hollow, and although in the latter the central canal is microscopic in size, in the former it is larger, and forms hollow spaces within the brain called **ventricles.** These contain a clear, limpid fluid, the **cerebro-spinal fluid** (C.S.F.), which also bathes all parts of the brain through its lymphatic system, and flows out over the outer surface. It is secreted by a glandular tissue in the ventricles called

the **choroid gland,** and is ultimately carried away by the venous sinuses, especially at the top of the brain and in the spinal cord. It is the source from which the neurons receive their nutriment, and it carries away the waste products of nerve energy. Certain definite changes occur in the C.S.F. in different diseases of the nervous system or even of the body generally, and small quantities are often extracted from the spinal canal in the lumbar region for examination (**lumbar puncture**).

The weight of the human brain is approximately 3 pounds, and is only exceeded by those of the elephant and whale. The size of their brains is accounted for by their great bodily bulk, and man's brain is larger in proportion to his body-weight than that of any other animal.

The brain may be divided into (*a*) the cerebrum; (*b*) the midbrain; (*c*) the cerebellum; (*d*) the pons; and (*e*) the medulla, which last merges insensibly into the spinal cord.

(*a*) The **cerebrum** represents about nine-tenths of the whole weight of the brain. It consists of two **hemispheres, right** and **left,** separated by the **great longitudinal fissure,** at the bottom of which they are connected by a flat band of nerve fibres called the **corpus callosum.** The surface of the hemispheres shows a number of folds (**convolutions** or **gyri**) and **fissures,** arranged in a pattern which at first appears to be irregular and haphazard, but which is similar in all human brains. The names of two large fissures—the most prominent on the outer surfaces—should be remembered; one, running roughly horizontally from before backwards, is called the **fissure of Sylvius;** another, running obliquely upwards and backwards from the latter, is called the **fissure of Rolando.** The large number of folds and fissures provides a greater surface area for the grey matter associated with the superior intelligence of man and the higher animals. On the other hand, the brain of a rabbit, a bird, or a fish is comparatively smooth. In the fissures lie the arteries supplying the convolutions and nourishing the cerebral cortex.

Each of the hemispheres of the brain is roughly divided into four **lobes:** the **frontal,** in front of the fissure of Rolando; the **parietal,** behind that fissure and above the fissure of Sylvius; the **temporal,** below the fissure of Sylvius; and the **occipital,** at the posterior pole. There is also a fifth lobe, the **insula (Island of Reil)** concealed in the depth of the Sylvian fissure in man, but exposed to view in lower mammals whose frontal

and temporal lobes are not so large. Of the functions of the insula nothing is known; but areas with definite functions have been identified in the other lobes, including such functions as voluntary movement, intelligent association, sight and the interpretation of things seen, hearing and its intelligent appreciation, speech (spoken and written), taste, and smell. The areas governing our **motor functions** lie in the frontal lobe, just in front of the fissure of Rolando, the **leg area** being placed above, the **arm area** in the middle, and the **face area** below. In front of the face area is the **centre for speech** (in the left

FIG. 83.—LATERAL VIEW OF LEFT HEMISPHERE AND MEDIAL VIEW OF RIGHT HEMISPHERE, SHOWING THE PRINCIPAL IDENTIFIED FUNCTIONAL AREAS; AND (BY CURVED LINES) SOME OF THE LONG FIBRE TRACTS.

1, Intermedio-precentral; 2, precentral; 3, postcentral; 4, intermedio-postcentral; 5, audito-sensory; 6, audito-psychic; 7, visuo-psychic; 8, visuo-sensory; 9, smell. *a*, Sight to hand; *b*, sight to speech and touch; *c*, speech to hearing; *d*, face movements to smell; *e*, sight to hearing.

hemisphere in right-handed people, and *vice versa*, as explained later). The cortex in the zones just in front of these areas is concerned in the more skilled and specialised movements which require a greater degree of intelligence for their execution, such as **writing.** Still further forward, at the extreme front of the frontal lobe, the cortex is supposed to be devoted to the skilled and intelligent combination of all ideas and notions of movement, though this is at present far from proven. Immediately behind the fissure of Rolando are areas where sensations are received from parts of the body represented in motor areas in front of that fissure. These areas grade off behind into a region in which such sensations are analysed, combined with each other and with those from the special senses, and built up into complicated ideas and conceptions.

All sensations pass through the thalamus, and may there give rise to emotions of pain or pleasure; but it is only when they reach this area of the cortex that they can be accurately localized and intelligently interpreted.

Similarly, in the case of the special senses, we find that we can distinguish very fairly defined areas concerned with the physical sensations from these organs, each of them surrounded by a vaguer area concerned with the mental or psychic aspects of these sensations.

At the upper edge of the temporal lobe, nearly hidden in the Sylvian fissure, is the centre for the reception of **hearing** impressions. On the mesial aspect of the temporal lobe is the **smell** centre, and at the tip of the lobe possibly the **taste** centre. At the furthest posterior pole of the occipital lobe is the centre for the reception of **sight** impressions.

In Fig. 83 considerable portions of the brain are left unshaded; it is generally supposed that the sensory special areas grade off into one another, joining up the impressions of all the senses and forming complete ideas or percepts of them. All the above-mentioned centres are connected together by innumerable long and short fibre tracts, and Fig. 83 indicates these by a few curved lines. The greatest importance is attached to the strands joining the motor and visual areas, for by his combination of hand and eye man has largely attained his pre-eminence. Scarcely less important are the strands joining speech and hearing, speech and sight, and hearing and sight, and connecting all these up with bodily sensations. Thus are memory and intelligence built. The **corpus callosum,** the broad bridge (or commissure) joining the two hemispheres together, is likewise very important. It is not to be supposed that the long fibre tracts are uninterrupted. Probably they are made up of large numbers of comparatively short parallel fibres, just as a long distance trunk message from one city to another may be relayed many times in passing through intermediate towns. Just above the corpus callosum, on the mesial side of the hemispheres, is a rather complicated system of convolutions called the **limbic lobe,** the most ancient part of the cerebral cortex. To the lowly vertebrate smell was all important; but in man other parts of the brain have curled up over and around the old reflex centre, which seems not to be undergoing further development, for the centre for intelligent smell lies in the temporal lobe.

The Minute Structure of the Cerebral Cortex.—A section of any part of the brain shows, from the surface to the depth of about $\frac{1}{4}$ inch, the pinkish **grey matter** which covers the whole of the cerebrum and is called the **cerebral cortex.** This grey matter follows accurately the folds on the surface, and contains the nerve cells and unmyelinated nerve fibres.

The cortex of the cerebrum may be divided into five layers; these are called from without inwards (1) the outer fibre

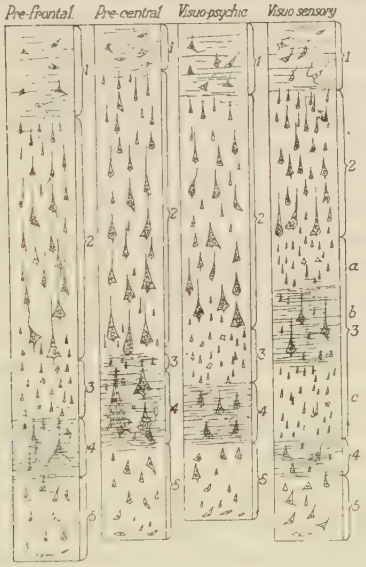


FIG. 84.—SHOWING DIAGRAMMATICALLY THE FIVE LAYERS OF THE CEREBRAL CORTEX IN SOME OF THE IDENTIFIED AREAS. (After Bolton.)

1, Outer fibre layer; 2, the pyramidal cell layer (supragranular); 3, the granular cell layer; 4, the inner fibre layer; 5, the polymorphic cell layer (infragranular).

Note that in the visuosensory area the granular and inner fibre layers are double, and in the precentral area there is practically no granular layer.

layer; (2) the pyramidal cell layer; (3) the granular cell layer; (4) the inner fibre layer; (5) the polymorphic cell layer. Both cells and fibres occur in all of these layers, but vary in proportion in each layer, and the above names are convenient because they indicate which predominates in the respective layer.

In preparing a section of the cortex for microscopic examina-

tion, we require to use different staining methods for cells and fibres, so we cannot show them all in any one preparation; but in Fig. 84 a picture is given of a few of the many cells and fibres according to the proportional thickness and comparative sizes.

We need not say any more about the fibre layers; they are chiefly made up of axons of cortical cells and of cells at lower levels that are leaving or entering the cortex. The lowest cell layer, the **polymorphic (infragranular) layer,** is mostly connected with lower centres of the nervous system, and is concerned with the performance of organic and instinctive reactions; this layer differs very little in unintelligent animals and in man, but in the former, such as the mole or hedgehog, it is the only layer present. The largest cells in the brain are some neurons in the fourth and fifth layers of the motor cortex whose axons form the pyramidal tracts in the cord. These are called **Betz cells,** and are the regulators of voluntary movements in the limbs. The middle cell layer (**granular layer**) consists of small round cells, and is thickest in the sensory areas, and practically absent in the motor area. In the visual area it is doubled, and the axons are so numerous that the inner fibre layer is doubled too. Wherever these small round cells are found their function is looked on as transforming or distributing. The outer cell layer is the **pyramidal (supragranular** or **association) layer**, the larger cells being deeper and the smaller near the surface, but all of good size. These are the crowning achievement of nervous architecture. In such lower mammals as are intelligent enough to have any pyramidal layer at all, the cells are few and some are undeveloped, but in man there is row upon row of large cells, with bushy dendrites of unusual length, spreading and intertwining like the undergrowth in a tropical forest. The axons of these cells connect different parts of the cortex together, each with every other part, and when you come to read the section on " The Mind in Health," you must realize that intelligence or mind is a capacity for learning by experience, through having in every cortical centre a memory of former racial and individual experiences linked up ready to act through the axons of the pyramidal cell layer. In the ancient centre of smell, the limbic lobe, there is no pyramidal layer, but a small centre has been established in the temporal lobe whose cortex contains a pyramidal layer to which intelligent smell has been transferred.

In a fairly intelligent animal, such as the cat or dog, there

is a thin pyramidal layer with partly developed cells. Such an animal may develop further. In the rat there are no undeveloped cells; his thin layer has ceased to grow; his brain development has ceased. The thicker the pyramidal layer the greater the intelligence. In idiots the layer is only about half as thick as in a normal man, and in advanced dements the layer has largely wasted away. And, further, the pyramidal layer varies in thickness in different cortical areas, as you see from Fig. 84; for example, in the visual area, it is narrower in that part which is concerned mainly with the reception of sight impressions than in the surrounding zone concerned with their psychic aspect. It is well developed in the motor area, and best of all in the anterior portion of the frontal lobe.

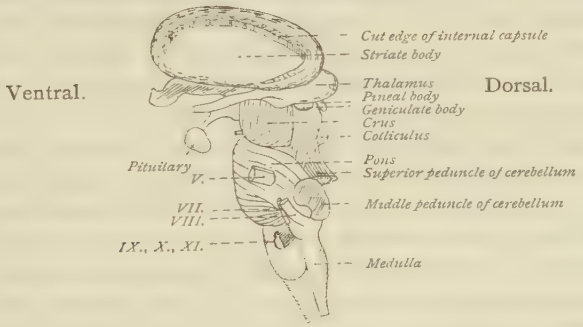


FIG. 85.—HUMAN BRAIN STEM: CORONA RADIATA AND CORTEX HAVE BEEN DISSECTED OFF. (Cunningham.)

The interior of the cerebrum, beneath the grey matter, is whitish in colour, and is called the **white matter.** It is composed of nerve fibres, which are here myelinated, and this gives it the white appearance. Both grey and white matter contain a small quantity of neuroglia. The white matter is arranged in bands, the **corona radiata,** consisting of multitudes of fibres which run to and from the cortex and parts below—namely, the thalamus, pons, cerebellum, and cord.

The Basal Ganglia.—Deeply situated at the base of the brain, round the ventricles and brain stem, are the basal ganglia—namely, on each side, a **thalamus** and a **striate body.** The two thalami, right and left, are near the middle line, and the slight dilatation of the central canal between them forms the **third ventricle.** The striate bodies are further out and forwards and

arch over the thalami. In a horizontal section a narrow strip of white matter is seen to run down through the striate body, and to pass down between that body and the thalamus. This is called the **internal capsule,** and it carries the **pyramidal tracts** from the motor areas to the spinal cord. As before mentioned, hæmorrhage into it causes paralysis of the opposite side of the body.

(*b*) **The Midbrain.**—It is difficult to make clear the relations of the basal ganglia to the cerebral hemispheres on the one hand and the midbrain on the other, but it is still more difficult to explain the relations of the midbrain to the brain stem, pons, and medulla. If a Japanese chrysanthemum is seen in the bud, it is plain that the half-opened flower springs from the stalk; but when it is fully expanded, and the long, feathery petals spread on all sides and droop over, they completely hide the stem from which they arise. It is so with the human brain. The enormous development of the hemispheres has wholly engulfed and surrounded the basal ganglia, and has concealed from view the midbrain. And yet this small structure, about 1½ inches long, is very important, as was explained in the section devoted to development, for it represents the first attempt of the primitive brain to attain co-ordinated voluntary movements. In the brain of a fish or snake it is seen to be an expansion of the front end of the medulla, leading to the thalamus and striate body further forward.

The central canal in the midbrain is very narrow; it connects the third ventricle above with the fourth ventricle below. And this is a suitable place for explaining another difficulty. The surfaces of the midbrain, pons, and spinal cord used to be called, in human anatomy, "anterior" and "posterior." This was because man stands erect. But as it was desirable to have names which would apply to four-footed animals, snakes, or fish, the term "ventral" (towards the belly) is now given to the anterior parts, and the term "dorsal" (towards the back) to the posterior parts; and these terms we shall in future use. The ventral surface of the midbrain shows the two thick **peduncles** (**crura** or legs) of the cerebrum, separating somewhat above, and disappearing into the depths of the brain. These legs contain the fibres which run lengthwise up and down between brain, medulla, and cord. The dorsal surface shows the two pairs of **colliculi,** the anterior and larger pair devoted to reflex vision, the pos-

terior devoted to reflex hearing. Between them is the **pineal gland,** which is held to be the old central eye of the primitive vertebrate. The midbrain also contains the neurons controlling the movements of the eyeball (vide Fig. 85).

The term " nucleus " is used to describe certain collections of nerve cells or comparatively isolated patches of grey matter, and one of these, in the midbrain, which can be recognised by its more pronounced pink colour, is called the **red nucleus.** From the red nucleus an important tract runs down the spinal cord called the **rubro-spinal tract,** which in fishes, reptiles, and birds is the voluntary motor tract, but in mammals is concerned with the control of automatic movements and postures, its voluntary functions being mainly taken over by the pyramidal tracts.

(*c*) The **cerebellum** consists of a **middle lobe,** called the **vermis,** devoted to reflex muscle tone and balance, and two **hemispheres,** devoted to the maintenance of muscle tone during voluntary movement. The quicker an animal is in its movements the better developed is the middle lobe; the more highly developed and intelligent are its movements the larger are the hemispheres. On cutting open the cerebellum we see a leaf-like arrangement of its grey matter, forming its cortex. The cerebellum is connected with the other parts of the central nervous system by bundles of fibres, three on each side, called the **peduncles of the cerebellum,** the upper and lower forming between them the lozenge-shaped **fourth ventricle.** The upper pair carry fibres from the central ganglia of the cerebellum to the red nucleus; the lower pair carry fibres from the cord to the cerebellar cortex. The middle pair form the pons, and will be mentioned next.

(*d*) The **pons** (or bridge) is merely the projection on the ventral surface of the upper medulla of the mass of white fibres joining the two hemispheres of the cerebellum, and forming their middle peduncles or feet. Below the surface are masses of cells arranged much as in the medulla. There also run through it the **descending tracts** from the brain and the **ascending tracts** from the cord.

(*e*) The **medulla** represents the primitive undermouth ganglion, and has altered less during evolution than any other part of the nervous system. In man it has lost most of its voluntary functions, but it remains the essential centre for the neurons which control the involuntary functions of circulation, respiration, and digestion. A trifling injury to the medulla is

fatal. The medulla opens out dorsally into the fourth ventricle, whose roof is covered merely by piarachnoid. This is the only place where in man the central canal has not yet become entirely surrounded by nervous matter. At the lower part of the medulla the greater number of the fibre bundles, which run down from the motor areas through the internal capsule to the cord, **decussate**—that is to say, those from the right hemisphere cross to the left side of the cord and *vice versa*. These fibres form the **crossed pyramidal tracts** in the lateral columns of the spinal cord. Some fibres do not cross until further down, where they filter across gradually, a few at a time, just before entering the grey matter of the cord. These form, before crossing, the **direct pyramidal tracts** in the anterior white columns of the spinal cord.

It is well to emphasize here that all nerve paths from the brain to the periphery cross from one side to the other somewhere in their course, so that the right side of the brain supplies the left side of the body and *vice versa*.

2. The Spinal Cord.

Before considering the structure of the cord, it is advisable to define two terms which occur constantly in descriptions of the nervous system—namely, "ganglion" and "plexus." The word **ganglion** is often used in surgery to describe a swelling occurring on a tendon sheath or else a small painful tumour on the end of a cut nerve. In neurology we use the word to indicate a network of closely connected nerve cells and fibres; while **plexus** indicates a close network of nerve fibres alone. These terms, however, are used rather loosely, and occasionally a structure in which there are plenty of nerve cells is called a plexus, as, for instance, the solar plexus. This contradiction is more common in the involuntary nervous system, and you must be prepared to meet with it.

The **spinal cord** lies in the tunnel (**spinal canal**) formed by the bony arches of the vertebræ. It starts in the neck, just outside the skull, where it is continuous with the medulla, and extends down as far as the upper part of the loins, where it breaks up into the nerves which supply the pelvis and legs. It is covered by the same membranes as the brain, with this difference, that the dura is loose and baggy in the spinal canal, instead of being firmly attached to the bones, as in the skull.

The blood supply is derived from the various arteries lying near it at different levels. Small arterioles enter the bony spinal canal (not to be confused with the " central canal of the cord "), and pierce the dura to reach the cord.

In the cord the **grey matter** is arranged round the **central canal,** roughly in the form of the letter H, with two **ventral** and two **dorsal horns** extending from the central mass. Throughout the grey matter all the way up the cord, nerve cells having various functions are arranged in definite **grey columns.** Immediately round the central grey matter are the short **white fibre tracts,** connecting adjacent segments of the cord. Nearer the outside are the ascending and descending white fibre tracts, and these, too, are arranged in definite groups. The nerves come off from the spinal cord in pairs and pass out between the vertebræ. Each nerve has two roots, a sensory from the dorsal, and a motor from the ventral, horn of the cord. Each sensory root has a ganglion on it. This ganglion contains the nerve cells, from which the sensory axons take origin. The cord must be looked at from two points of view—as an independent centre and as a conducting path. In worms the latter function is less in evidence, but in all higher animals the conducting of impulses up and down, and the transforming of such impulses in their course, is of greater importance. Nerve impulses passing to and from the cerebrum are, as it were, relayed by cells in the grey matter of the horn, somewhat after the manner in which a long-distance telephone message may be transmitted through several stations by a system of relays.

If we divide the cord into right and left halves, and each half into columns, by the ventral and dorsal roots, we have three columns in each half, called the **anterior, lateral,** and **posterior white columns.** The posterior columns alone are absolutely distinctive in function, and they consist of ascending fibres which have passed in by dorsal roots but have not yet formed synapses with the nerve cells in the grey matter of the dorsal horn. By no means all of them have to do with consciousness; some convey unconscious muscle and joint sensations, having to do with tone and balance. Those concerned with conscious sensations convey impressions of heat, cold, pain, and touch. The sensations of touch are very complex, and embrace not only the knowledge of being touched, but such intellectual factors as the position of the spot touched, comparisons of intensity, and

differences of shape and texture. Even the more primitive sensations of pain may involve all these refinements. All sensory nerves go up the cord to the thalamus, and fresh sets of fibres run from the nerve cells in the thalamus to the brain cortex; and thus intelligent judgments upon the sensations experienced are rendered possible. The paths taken by the fibres conveying different afferent impressions, both conscious and unconscious, cross over to the other side of the cord as soon as they reach a dorsal horn cell, and run up the lateral white columns of the opposite side. Some fibres, such as those conveying pain and temperature, cross almost at once, within two or three segments; some kinds of touch fibres are found to cross at varying levels on their way up; while others, such as those conveying conscious and unconscious discriminating impressions of texture, shape, etc., as well as the sense of the position and movements of joints and muscles, do not cross until they reach the medulla. These ascending fibres, wherever they may have crossed, pass up, after crossing, in the lateral white columns, arranged all round their margins. As regards the rest of the lateral columns, roughly speaking, the centre of each is occupied by descending motor tracts, principally the pyramidal and rubro-spinal, both of which have crossed from the other side higher up than the cord. The anterior white columns, which grow smaller as we pass down the cord, consist mostly of pyramidal fibres which have not crossed in the medulla, but only cross as they are about to approach an anterior horn cell and pass out by the anterior root of a peripheral nerve. Fig. 86 shows three of the principal systems of long connecting tracts up and down. It should be realised that things are much more complicated than the diagram shows, for all the interconnecting short tracts in the cord have been left out, as well as the immense mass of connections between medulla, pons, cerebellum, thalamus, striate body, and brain cortex, all of which are necessary to co-ordinate our conscious and unconscious life. The various tone and balance reflexes, in fact postures generally, are effected through the cerebellum and red nucleus (see green and red dotted lines), and have no necessary connection with consciousness at all. The primitive responses to painful impressions are brought about through the thalamus and striate body and the connections of the latter with the red nucleus in the midbrain (see green and red interrupted lines). These muscular movements are automatic reflexes, and the descending path is the

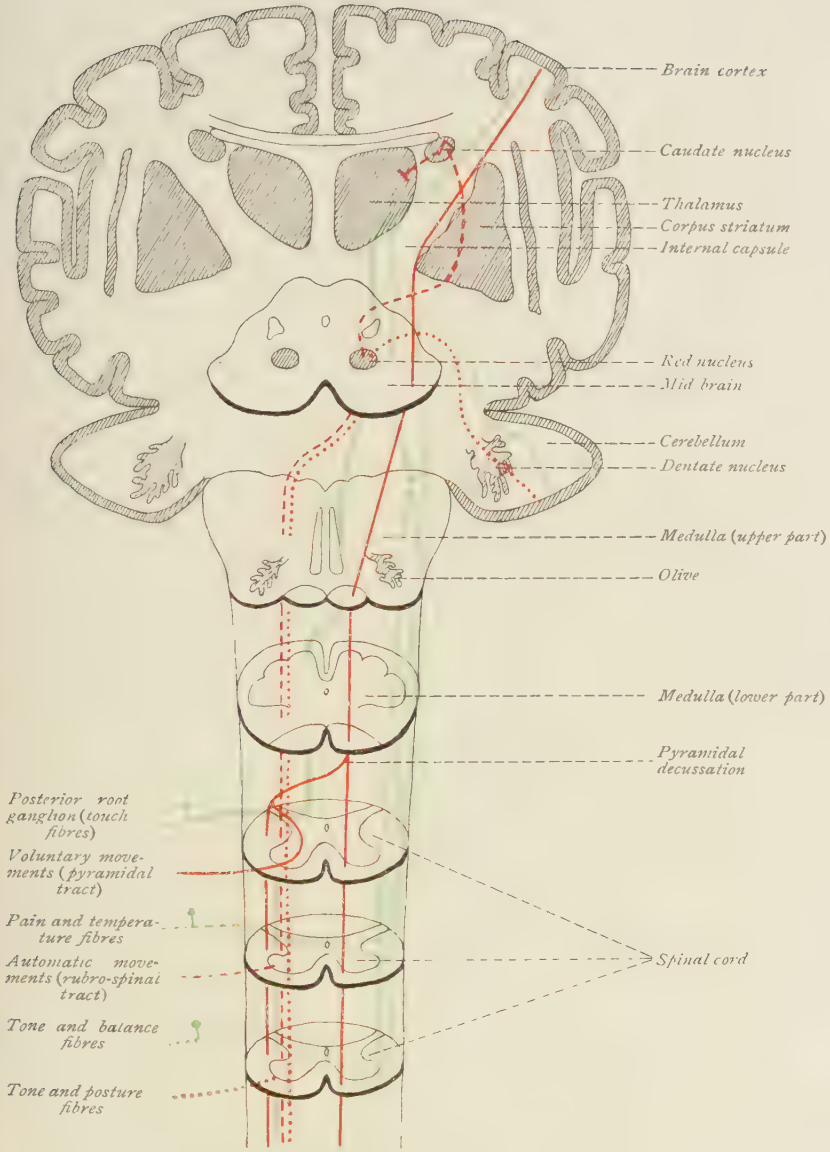


FIG. 86.—THE AFFERENT (ASCENDING OR SENSORY) [green] AND EFFERENT (DESCENDING OR MOTOR) [red] PATHS BETWEEN THE PERIPHERAL NERVES AND THE BRAIN.

To face p. 306

rubro-spinal tract. Lastly, the brain cortex is reserved for the higher intelligent sensations requiring judgment, and the voluntary movements which result from these are effected by the pyramidal tracts coming from the brain cortex. It is only in the mammals that this intimate connection between brain cortex and muscles exists, and only in man that the pyramidal tracts are essential for voluntary movements. (This is shown on the diagram by continuous green and red lines.)

3. The Peripheral Nerves.

The **peripheral nerves** are the bundles of axons, bound together by tough connective tissue, that emerge from the brain and cord. The former are called **cranial,** the latter **spinal.**

The **cranial nerves** form very complicated connections both inside and outside the brain, so that the fibres arising originally from one part of the brain may emerge in quite different nerves in different animals, and yet arrive in the end at corresponding muscle fibres or skin areas. Generally speaking, the cranial nerves are motor and sensory to the head and neck, and among the sensory are the nerves of special sense. Most of them also convey fibres of the involuntary nervous system, and the lower ones, especially the **vagus** and **spinal accessory** nerve, are nearly all composed of such fibres. The nerves of special sense—that is, the olfactory, optic, and auditory nerves—will be considered later, but it should be noticed that there is a tendency in the cranial nerves for the motor and sensory fibres to run in separate trunks, whereas every spinal nerve contains both motor and sensory fibres, and is therefore called a " mixed " nerve.

You will see that the **fifth,** or **trigeminal,** and the **seventh,** or **facial,** together form a mixed nerve to the face and head, while the **ninth,** or **glosso-pharyngeal,** and **twelfth,** or **hypoglossal,** together form a mixed nerve to the tongue, jaws, pharynx, and upper neck, the parts concerned in mastication and voluntary swallowing. These are the old original voluntary parts of the undermouth ganglion mentioned in the section on development. The course and distribution of the cranial nerves are so complicated and difficult that it will not be necessary for the nurse to learn them, and merely a list will be given. An exception may be made in the case of the **trigeminal,** which is the nerve involved in neuralgia and toothache. It emerges from the skull near the ear, and has three large branches, the **ophthalmic,** to the eye and

forehead, the **superior maxillary** to the upper jaw, teeth and cheek, the **inferior maxillary** to the lower jaw, teeth, and chin. Deep under the skull there is situated in the course of the fifth nerve a large network called the **Gasserian ganglion,** wherein its fibres are rearranged; it is sometimes injected with absolute alcohol or even partly cut out, as an operation for otherwise incurable neuralgia in its worst form, the so-called " tic douloureux."

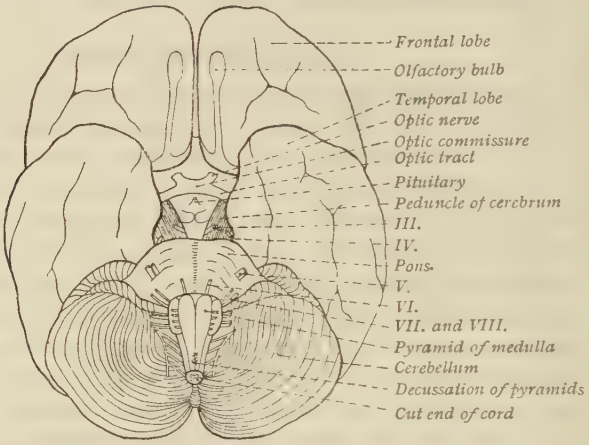


FIG. 87.—BASE OF HUMAN BRAIN.
The cranial nerves in Roman numerals.

List of the cranial nerves (Fig. 87):

I. Olfactory—special nerve of smell.
II. Optic—special nerve of sight.
III., IV., VI. Motor to muscles of eyeballs.
V. Trigeminal—sensory to skin of face, and to teeth.
VII. Facial—motor to muscles of face.
VIII. Auditory—special nerve of hearing and balance.
IX. Glossopharyngeal
X. Vagus
XI. Spinal accessory
} Sensory and motor to the voluntary and involuntary mechanism of mastication, swallowing, and digestion. Involuntary to heart and lungs.
XII. Hypoglossal—motor to voluntary muscles of tongue.

The **spinal nerves** arise from the cord. It will be remembered that in invertebrates the cord is formed of a series of ganglia joined together by comparatively narrow connecting tracts. In the higher animals it is practically uniform all the

way down, but in proof that it originally consisted of separate segments we find the fibres coming off in successive bundles instead of continuously. The cord is divided into segments named after the corresponding vertebræ, with an extra one above the atlas. There are therefore eight **cervical** pairs of nerves, twelve **thoracic,** five **lumbar,** and five **sacral,** but there is only one **coccygeal.** In the infant the cord reaches to the lower end of the spinal canal, but it does not grow so fast as the chain of bones, so that in the adult it is relatively shorter, and at its lower end it is resolved into a tail of nerve roots called the **cauda equina** (" horse's tail ").

As already stated, each nerve arises by two roots, which are ventral and dorsal respectively, and emerge from the corresponding horns of the cord. On each dorsal root is a ganglion where nerve cells intervene on the axons. These are called the **dorsal root ganglia.** The roots then join, pierce the spinal canal between the vertebræ, and are distributed to the muscles, bones, ligaments, and skin of the trunk and limbs.

Some of the spinal nerves are grouped into plexuses, as follows:

Cervical plexus—C1 to C4.
Brachial plexus—C5 to Th1.
Lumbar plexus—L1 to L4.
Sacral plexus—L5 to S4.

The **cervical plexus** supplies the occiput and neck. The only nerve the nurse need remember is the **phrenic,** which runs down the neck and chest and supplies the diaphragm. It receives involuntary fibres in the chest, which accounts for the well-known fact that the diaphragm is only partly under the control of the will.

The **brachial plexus** supplies the shoulder and upper limb. It has many important named branches, and the nurse must remember a few. The **musculo-spiral** supplies a large part of the arm. The **radial, median,** and **ulnar** supply the forearm, hand, and fingers.

The thoracic nerves do not form a plexus, but run separately along the ribs as the **intercostal nerves.**

The **lumbar plexus** supplies the pelvis and genital organs and sends its largest branch, the **anterior crural,** down the front of the thigh with the femoral artery.

The **sacral plexus** supplies the buttock and lower limb. Its largest branch, the **great sciatic,** is the largest nerve in the body. It emerges from the pelvis deep in the buttock with the gluteal

artery, and supplies the back of the thigh, leg, and foot, by dividing into two branches, the **external popliteal** and the **posterior tibial.** Neuritis of this nerve is called sciatica.

The lower sacral and coccygeal nerves are very small, and supply the parts about the coccyx and anus.

All the spinal nerves being " mixed " nerves are both sensory and motor. The sensory fibres, which enter the dorsal roots of the cord, contain two great classes of fibres. One kind, the protopathic, are non-myelinated, and belong to a very primitive type, representing the old, vague kind of sensation found in simple animals. The other, epicritic, are myelinated, and are of much later development in animals. **Protopathic fibres** convey four kinds of sensation, pain, heat, cold, and an ill-defined variety of touch which depends on pressure or distortion of a tissue. Protopathic fibres end in the thalamus. **Epicritic fibres,** on the other hand, probably convey many types of sensation, of which only a few have been worked out. The principal ones are exact localisation of a spot touched, estimation of the comparative strengths of stimuli, of the comparative degrees of warmth and coolness, and of muscle and joint sensations, which partly are unconscious and go to the cerebellum, and partly are conscious, conveying to the cerebral cortex appreciation of position and passive movements of limbs. With the exception of the unconscious cerebellar sensations which help to regulate posture, all the other epicritic fibres are intimately connected with the brain cortex in the sensory areas, by an extension from the thalamus; and our appreciations of the nature and quality of a thing touched, its shape, weight, position in space, etc., are all intellectual processes involving the brain cortex. But much has yet to be learned about epicritic nerves, and the exact nature of the sensations they convey. There is no difficulty in experiencing the difference between epicritic and protopathic sensations. When the hand is extremely cold and the epicritic end-organs in the skin are benumbed, a comparatively slight knock on the knuckles may produce a severe pain radiating up the arm, which shows us the value of epicritic fibres in localising and controlling the more vague and unrestrained protopathic sensations.

The various types of protopathic and epicritic fibres are very differently distributed to the different body tissues. Thus, most pain and temperature fibres go to the skin, and many touch fibres to the fingers. Only pain fibres are present in the teeth,

and no pain fibres exist at all in the brain, although they are abundant in the dura. The muscles and tendons, especially near the joints, and the joints themselves, are richly endowed with position fibres, both conscious and unconscious.

II. THE INVOLUNTARY NERVOUS SYSTEM.

There was a time when the lowly one-celled animal lived by chemical changes alone. That method is still used in our bodies (see Hormones, p. 73). But although this method was sufficient when all went well, yet, when stress arose or conditions of life were unfavourable, some quicker and more co-ordinated system was needed to control the vital processes, and hence arose the involuntary nervous system which we first saw in the under-mouth ganglion of the primitive invertebrate.

We have been at pains to describe the evolution of the nervous system from lower to higher types chiefly in order that the nurse may understand that the nerve mechanisms which were the only ones possessed by the primitive animal are preserved unchanged even with the highest form of development. The involuntary system is, as has already been said, in no way distinct and separate anatomically from the cerebro-spinal system. Its central neurons are placed within the latter—namely, in the cord and medulla—and the axons which compose its fibres emerge with the voluntary nerve trunks.

The involuntary nervous system is divided into two parts, the autonomic and the sympathetic. The autonomic is the older. Indeed, part of the voluntary nervous system also is older than the sympathetic, for, in fact, the sympathetic did not arise until the animal had advanced far enough in complexity to have a circulatory system. Fibres from both divisions are distributed to most of the internal organs, and when this is so the two divisions act antagonistically. Our respiration, circulation, and digestion go on during the whole of life, and in health we know nothing about them. The delicate balance of the processes is maintained by the sway, one way or another, of the two divisions.

The **autonomic centres** have been separated from one another by the development of interposed segments, as the animal lengthened out and acquired limbs. The centres are found (*a*) in the medulla, (*b*) in the sacral cord. Fibres from the

medulla have been found in nearly all the cranial nerves, but especially in the motor nerves to the eyes (third, fourth, and sixth), and in the glosso-pharyngeal, vagus, and spinal accessory; in fact, these last three are largely made up of involuntary fibres. The autonomic fibres emerge by the ventral roots and run down to the heart, lungs (bronchi), stomach, liver, pancreas, kidney, and small intestine. Fibres from the lowest portion of the spinal cord emerge from the ventral roots of the first, second, and third sacral nerves, and run to the large intestine, bladder, and external generative organs.

The **sympathetic centres** are in the thoracic portion of the cord. The fibres emerge from the ventral roots of all the thoracic nerves, and pass to small ganglia on the ventral aspect of the vertebræ. These ganglia are called the **prevertebral ganglia,** or **sympathetic chain.** From them the fibres pass to unstriped muscle in every bloodvessel all over the body, even the brain, to the heart, to the unstriped muscle in every gland in the body, salivary, sweat, abdominal (stomach, liver, pancreas, intestine, kidney), to all gland cells in the body, and to the unstriped muscle of certain sphincters in the intestine (the pylorus, ileo-cæcal valve, and anus). They also supply the bladder sphincter and internal generative organs. You would hardly imagine there was so much unstriped muscle fibre all over the body. Every gland has some in its capsule; the skin has quite a lot, as may be seen by the condition "goose-skin"; so have all the internal digestive glands in the abdomen, and also the bronchi. Besides this, as you are aware, the arteries, veins, and intestines are largely composed of unstriped muscle fibres.

Most of the involuntary fibres to the internal organs collect into three great distributing plexuses before going to the organs themselves. These are: (1) The **cardiac plexus** in the chest, round the heart and root of lungs; (2) the **superior mesenteric plexus** in the upper abdomen; and (3) the **inferior mesenteric plexus** in the pelvis. Another name for the superior mesenteric is the **solar plexus.** Every football-player knows what it is to be laid out by a kick or blow in the upper abdomen, what is popularly called being "winded." The collapse is the result of violence to the solar plexus, and it has even been known to have a fatal result.

The **autonomic division** of the involuntary nervous system slows the heart, aids digestion by its action on the gland cells, produces the active wave-like contractions of the intestine which

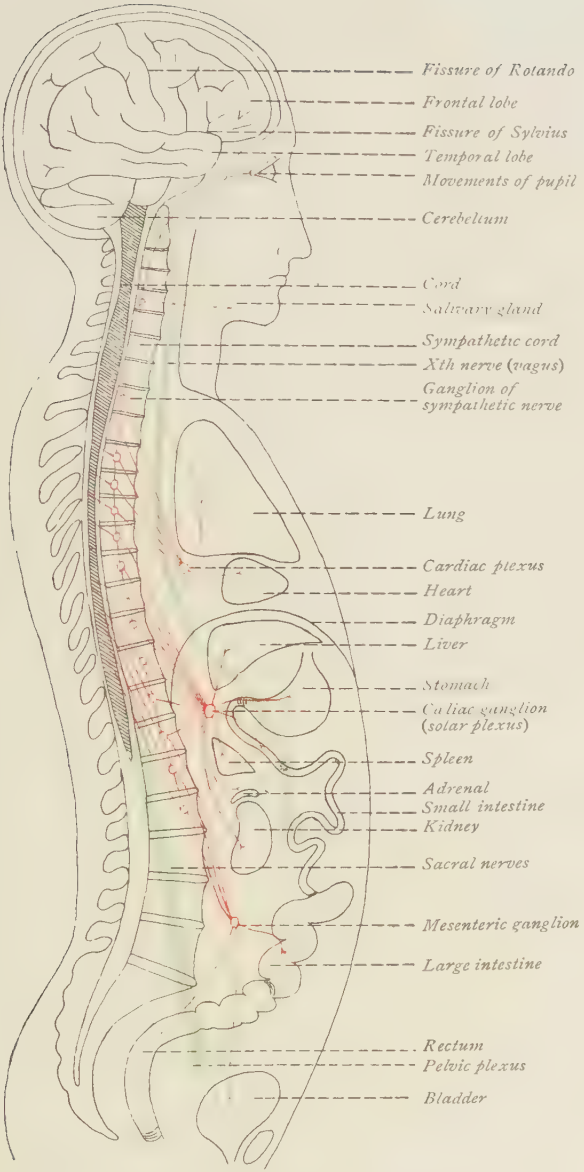


FIG. 88.—DIAGRAM OF THE DISTRIBUTION OF THE INVOLUNTARY NERVOUS SYSTEM TO THE INTERNAL ORGANS.

The sympathetic system in red, the autonomic system in green.

To face p. 312

pass along the contents, and contracts the bladder. In ordinary conditions the **sympathetic division** regulates the blood pressure all over the body by contracting or dilating the arterioles, and controls sweating; it quickens the heart and respiration, and by relaxation of sphincters regulates the movements of bowels and bladder. Intimately associated with the sympathetic division is the **adrenal gland,** and all sympathetic activity is accompanied by a discharge of the internal secretion of the gland into the blood. The autonomic slowly builds up and maintains the body system against a time of stress; the sympathetic warns against danger. The emotion of fear is the animal's first line of defence, and all the signs of terror are the effects of sudden and strenuous activity of the sympathetic system.

Little is known about the **sensory fibres** of the involuntary nervous system. They pass into the dorsal roots with the cerebro-spinal sensory fibres and disappear in the cord. The internal organs are poorly supplied with pain fibres, but when a strong stimulus arises the pain is severe. Thus, a pinch of the intestine is not felt, but the pain of colic or in some forms of heart disease is often agonising. Touch and localisation fibres are practically absent, and in all ways these involuntary sensory nerves seem to behave much like the protopathic cerebro-spinal nerves. Internal disease, however, can often be located to a definite cord segment by pain felt in the body walls or limbs, because the involuntary sensory fibres summon their cerebro-spinal companions to their aid, and the patient thinks the pain is in that part of the skin surface where those cerebro-spinal fibres are distributed. Such a pain is called a **referred pain.**

THE SPECIAL SENSES.

1. **Smell.**—The sensory cells connected with the sense of smell lie in the mucous membrane of a small portion of the upper part of the nose on both sides. The axons of these cells—the **olfactory nerve (first cranial)**—pass into the cranial cavity through holes in the ethmoid bone forming the roof of the nasal space to the **olfactory bulb** on the under part of the frontal lobe, where they end by forming a network round other cells whose axons pass backwards into the brain. The mucous membrane of the upper nostrils is kept constantly moist by the mucous glands which lie within it. Many smells owe their peculiar character to the fact that they also

stimulate nerves of ordinary sensation. Thus a pungent smell, such as that of ammonia or chloroform, stimulates both kinds of nerves. No really satisfactory classification of smells has been made. Certain persons cannot smell some odours at all, such as prussic acid, mignonette, violet, or vanilla. Some odours, when presented in combination, neutralise one another. Thus, a mixture of iodoform and balsam of Peru is in certain proportions odourless. Smell is easily fatigued, so that a person may be for the time insensitive to one type of smell and still be normally excitable to another. You may go into a very stuffy ward, and in a few minutes you cease to notice it; and you may easily become incapable of smelling an escape of gas.

It has already been explained how animals who live by smell have enormous olfactory bulbs, although in men these are "regressive," and quite small. Also you remember that smell was the first sense to join up with the primitive cortex, but that in man the limbic lobe has got so overlaid by the increase of other sense centres in front, behind, and at the sides that the centre for smell is now found, in the human brain, in the middle aspect of the hemisphere near the base, whereas in the fish it is in the upper front and external aspect of the hemisphere.

2. **Taste.**—The nerves which subserve the function of taste end in the mucous membrane of the tongue. The nerve endings lie in little pits of the mucous membrane, which we call taste buds. A **taste bud** is made up of special cells surrounded by nerve fibres. The middle of the upper surface of the tongue is feebly endowed with the sense of taste, while the tip, sides, and posterior third of the upper surface are specially sensitive. **Tastes** are classified into **sweet, sour, bitter,** and **salt.** Sweet tastes are best appreciated by the tip and sides, and bitter tastes by the back, of the tongue.

The substance to be tasted must be dissolved, in contrast with the sense of smell, which only appreciates substances in vapour form. What we often accept as taste may be really smell. Thus, when the nose is effectually shut off, it is almost impossible to distinguish the tastes of an apple and a potato, or between port and sherry. It is also a well-known fact that castor oil, which most people find most nauseating to take, becomes quite tasteless if the nose be held tightly till it is swallowed.

The taste tracts between the tongue and the brain are very complicated, and several cranial nerves carry the fibres for a

portion of their course, chiefly the fifth (trigeminal), the seventh (facial), and the ninth (glosso-pharyngeal).

3. **Sight.**—By means of the sense of sight we appreciate the form and colour, and also the size, distance, relative position, and movements of the objects around us. The eye or organ of sight, is similar in structure to a photographic camera—a box which is closed except for an opening in front in which a lens is inserted. By means of a photographic lens the image of objects is thrown on the back of the camera. To produce a sharply defined image,

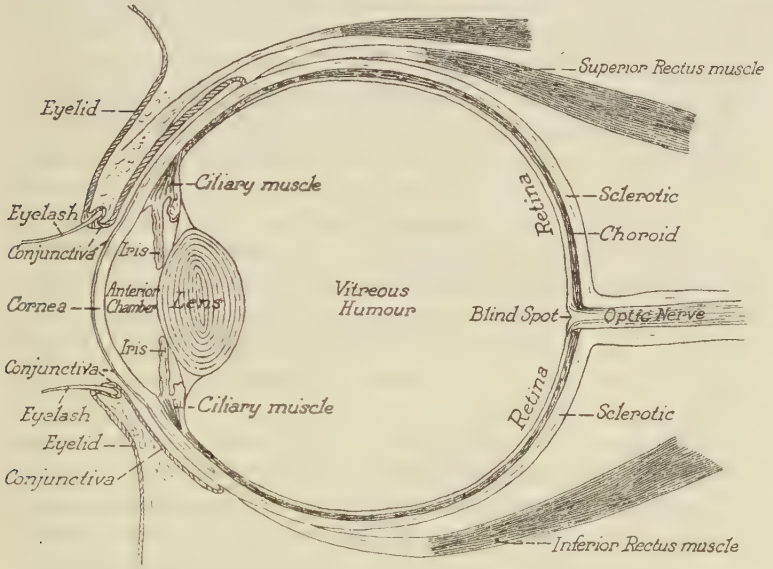


FIG. 89.—VERTICAL SECTION OF HUMAN EYE.

the lens is brought nearer to or moved further away from the back, where the film is placed, and the position of the lens will vary according to the distance of the objects which are being photographed. This process is called **focussing.**

The **eye** is a globe with a transparent portion (the **cornea**) in front, behind which is a **lens.** At the back of the eye is the **retina,** a thin membrane which represents the photographic film. The space between the lens and the retina contains a transparent jelly-like substance, the **vitreous humour.**

We are able to alter the shape of the lens of the eye by the action of the muscles round it, and this process is called **accom-**

modation, and is partly under the control of the will. Thus, we focus from a distant object to a near object entirely by an alteration in the shape of the lens, the retina remaining in the same relative position. In a camera, stops of various sizes are placed in front of the lens in order to regulate the amount of light which enters. In the eye this is effected by a coloured screen of involuntary muscle, the **iris**, which has a central aperture, the **pupil**, and is situated immediately in front of the lens. The size of the pupil is regulated by the muscles of the iris, varies by reflex action determined by the intensity of the light, and is not under voluntary control.

In the eye the effect of light is to stimulate the complex and delicate terminations of the optic nerve in the retina. This nerve carries the sensations to the cerebrum, and the sense of sight is localised in the cortex of the occipital lobe. Under certain conditions the lens may not be able to focus a clear image on the retina. A short-sighted (**myopic**) man can only see objects distinctly when close at hand, and a long-sighted (**hypermetropic**) man, while his distant vision is good, is unable to focus near objects. Long sight, with difficulty of accommodating to near objects, is normal in old age, and is called **presbyopia.** These defects may be corrected by placing appropriate lenses, in the form of glasses, in front of the eyes. In old people the lens sometimes loses its transparency and becomes opaque. This condition is called **cataract,** and is treated by removing the lens and placing in front of the eye, in the form of glasses, a lens of equal strength to that removed. Fig. 89 shows a section of the eyeball with the various structures marked, so that further description is unnecessary. In the line of vision is a small depression, the **yellow spot** (not shown on the diagram), where all exact sighting is focussed. There is no vision at the **blind spot,** where the optic nerve enters. This spot is not in the central line of vision, but about $\frac{1}{10}$ inch to the inner side. One of the difficulties experienced by the cricketer in playing high, leg-break lobs is alleged to be that the image of the ball in its flight passes for the fraction of a second over the blind spot, and this puts the batsman off because he does not recover sight of the ball in time.

The external muscles which move the eyeball are six in number —external, internal, inferior and superior rectus, inferior and superior oblique. The two latter rotate the eyeball on a

slanting axis; the others pull it in the directions their positions indicate.

The path from the retina to the brain is complicated. The two optic nerves run back through the bony orbit and meet just in front of the pituitary body, at the base of the brain. This is called the **optic commissure,** and an interchange of fibres takes place. These then separate and continue back as **optic tracts,** embracing the brain stem until they reach the midbrain. Here some fibres end in the **anterior colliculi;** these are the reflex fibres which help us to balance. The rest of the fibres go to a ganglion called the **geniculate body** (situated behind the thalamus), from which they are relayed to the thalamus and cerebral cortex; these are the voluntary sight fibres. The colliculi are connected with the oculo-motor nerves, and contain a perfect reflex mechanism for insuring that both eyes move simultaneously, for preserving the axes of vision parallel, and for enabling the gaze to remain fixed on any object even though the head and body move. The fibres of exact vision on the yellow spot are represented at the tip of the occipital lobe in the **visuo-sensory area.**

To understand two-eyed (binocular) vision, you must realise that most lower animals only cover a field of view with one eye at a time, seeing things on their left side with the left eye and on the right with the right. They have what is called " panoramic vision." But man, and to a less extent certain other animals—the cat, for instance—have overlapping fields, and both eyes see one object simultaneously, because the nose does not interfere with the line of sight. We have, in fact, " stereoscopic vision," and by this we can see objects in perspective, standing out in solid relief instead of as a flat picture, and so learn to judge distance, instead of having to trust to the size of an object. Now the pupil is small, and the image of an object on our left falls on the right side of the retina of each eye, and *vice versa.* So we talk of the " temporal field " and the " nasal field," which are seen by the nasal half and the temporal half of each retina respectively. Fibres passing from the eye to the optic commissure come from temporal and nasal fields, and the rearrangement of fibres is such that each optic tract contains all the fibres from the corresponding side of each retina; these pass on to the occipital lobe of the same side. In practice, therefore, we see with our right visual area objects on our left—that is, objects whose image falls on the temporal half of the right retina and on the nasal half of our

left retina—and, of course, with our left visual area we see objects on our right; but in an animal whose fields do not overlap, all the fibres from one eye go to the opposite occipital lobe. Furthermore, man has both visuo-sensory areas joined up, and also both thalami, and the latter to both visuo-psychic areas, and to every other area on both sides of his brain, especially to his hand areas. There are also centres in the motor-psychic area for movements of head and eyes, so that his whole brain can be intelligently applied to vision and all the movements arising from it. This is a very important element in human pre-eminence.

The retina contains three layers of neurons; sensations of light fall on the layer next to the front, the layer of the **rods and cones.** Birds of prey, with very keen vision, have nearly all cones; dull-sighted animals have few cones, mostly rods. In the human eye cones are most abundant on the yellow spot. So we presume that the cones are primarily affected by light, and the substance whose chemical changes stimulate them to carry images to the brain is manufactured in the rods. This substance is called **visual purple.**

The eyeball lies in a bony socket, the **orbit,** and is protected in front by the **eyelids.** These consist of a layer of dense fibrous tissue covered externally by skin, and on the inner side by a mucous membrane called the conjunctiva, and fringed by the delicate eyelashes. In the upper and outer part of the orbit is the small **lachrymal gland,** which secretes the fluid necessary to keep the eyeball moist. This fluid is drained away from the eye by two small canals which lead from the inner angle of the eye into the tiny **lachrymal sac,** and thence by the nasal duct into the lower part of the nose.

The irritation of pungent vapours or the influence of strong emotion may stimulate an excessive secretion of the lachrymal fluid, which then overflows the lower eyelid in the form of tear-drops.

4. **Hearing.**—By means of the sense of hearing we appreciate the pitch, the intensity, and the different qualities of sound. We can tell a loud sound from a faint one; we can distinguish between the notes of a musical instrument; we can recognise the difference between the sound of a piano and that of a violin. We can also hear and distinguish several sounds at one time, as when listening to an orchestra or choir. The organs of hearing include three parts—the external ear, the middle ear, and the inner ear.

The **external ear** consists of the **pinna** or ear, and the **auditory canal** or passage leading to the drum or **tympanic membrane,** which separates it from the **middle ear** (**tympanum**). The cells lining the canal secrete a yellow sticky wax. This not only keeps the drum and wall of the canal from becoming dry, but also hinders the entrance of foreign bodies. The **middle ear** is an irregular cavity in the temporal bone. On its outer side is the drum, and on the inner side is another smaller opening, the fenestra ovalis ("oval window"), closed by a membrane which separates the middle from the inner ear. The middle ear is traversed by a chain of minute bones or **ossicles**—the malleus, or hammer bone, the incus, or anvil, and the stapes, or stirrup-bone. The malleus is attached to the tympanic membrane, and the stapes, on the inner side, is attached to the smaller membrane which separates the middle from the inner ear. The incus lies between and connects the malleus and stapes, The **inner ear** is contained in an irregular long hollow in the temporal bone, and its lower portion is occupied by a sac full of fluid (the **labyrinth** and **cochlea**), in which lie the nerve endings of the auditory nerve. Extending from the lower part are three long, arched tubes, the **semicircular canals,** about $\frac{1}{20}$ inch in diameter. These consist of two nearly vertical canals, one running front to back and the other side to side, and a third canal which is horizontal. They are concerned with balance, and movement in any direction causes a disturbance of the fluid they contain, which has an effect on delicate nerve endings, so that any change of position is immediately noted and the brain informed.

The sound vibrations collected by the ear pass from the auditory canal to the tympanic membrane, the vibration of which sets in motion the chain of three small bones. The vibration of the inner bone, the stirrup, affects the small membrane at the entrance to the inner ear, and this in its turn disturbs the fluid within the inner ear. The vibration of the fluid of the inner ear affects the sensitive nerve endings in the labyrinth and cochlea. Sounds are thus heard and distinguished.

The middle ear is connected with the nose by a narrow passage called the **Eustachian tube.** Through this the normal air pressure is maintained in the middle ear. It may be a source of danger, as infection from a sore throat or nose may, and often does, travel into the middle ear, causing inflammation, abscesses, and consequent partial or complete deafness. The

ear of a patient who suffers in this way discharges pus when, owing to the Eustachian canal being closed, an abscess has burst through the drum. Slight inflammation and swelling of the walls of the Eustachian tube cause an alteration of air pressure in the middle ear which results in some degree of deafness. Fig. 90 shows a section of the human ear, in which you can see the relations of the various parts. Remember that the external and middle ear, as well as the cochlea of the inner ear, are concerned with hearing alone, and that the semicircular canals of the inner ear are concerned only with the unconscious balance. It will be seen that the **auditory nerve (eighth cranial)** has two distinct parts, corresponding to the two functions. Both parts keep in close

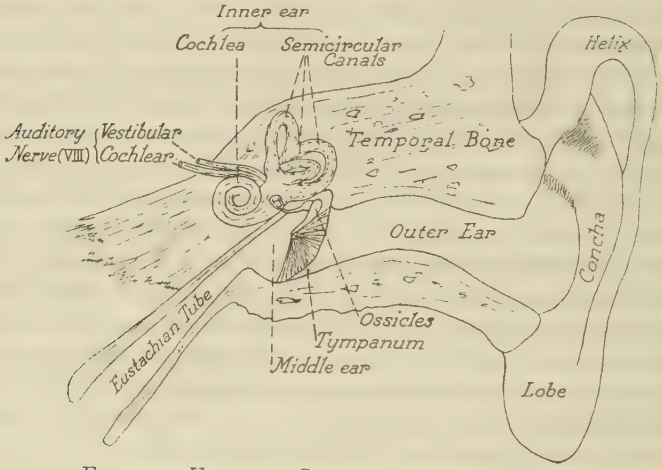


FIG. 90.—VERTICAL SECTION OF HUMAN EAR.

company until they enter the pons. The **cochlear** (hearing) branch then crosses to the other side and runs up the margin of the brain to the midbrain, where it divides, one bundle of fibres going to the posterior colliculi and pertaining to reflex movements in response to sound, the other bundle going to the geniculate body and being relayed into the temporal lobe, where the cortical hearing centre is situated. The **vestibular** (balance) branch keeps near the central canal of the brain stem, some fibres crossing the middle line, others not. It also divides into two bundles, one passing near the central canal to the posterior colliculi, the other by way of the inferior peduncles to the middle lobe of the cerebellum. It will now be seen how reflex sight and reflex hearing are placed close together, and how they act

together in the anterior and posterior colliculi to give warning of danger long before the intelligence of the brain can act. On the other hand, the cortical paths of both intelligent sight and hearing pass by the geniculate bodies to the occipital and temporal lobes respectively. There is no direct connection between the colliculi and thalamus, so we assume that reflex sight and hearing are always entirely unconscious—in fact, we know it in everyday life when we duck the head involuntarily as a bird flies past, or jump at the noise of a slamming door. You have already learned, too, how the middle lobe of the cerebellum gradually developed in connection with the reinforcing of postures and movements, especially against gravity. There is a not uncommon parlour game in which a person is made to bend down and is turned round a few times, then asked to walk along a line. He staggers, and deviates to one side, and may even fall down, because his reflexes are disturbed by the rapid rotations starting a movement in the fluid in the semicircular canals. It is really a test of his "vestibular reaction," for if he has disease of the vestibular nerve and has learned to walk straight by sight or the feel of his muscles, he will be no worse off if whirled round, and will not stagger or deviate. Again, when a person has just learned to ride a bicycle and first goes out at night, he wobbles badly and has to learn over again. This is because he first learned to balance by sight, but at night he must use his vestibular apparatus. Both mechanisms have their centre in the midbrain, and are connected with body and limb muscles by a reflex apparatus down through the medulla and cord. The vestibular apparatus is very ancient, and found in lowly and primitive invertebrate animals, but the cochlear (hearing) function of the ear did not begin until ages later, when the early vertebrate had left the water and could appreciate the vibrations of air which we call "sound waves."

By far the most important aspect of hearing is that it forms the sensory (afferent) side of speech. We know that all the higher animals and birds have cries which bear different meanings—food, alarm, anger, love. But in man alone have these developed into an enormous variety of sound symbols, with all sorts of different meanings, which sets of symbols are called "language." And yet how few are the unit sounds—about twelve vowel sounds made by the vocal cords and modified by the shape of the pharynx, and about twenty-five consonants formed

by different positions of the tongue, lips, and teeth. From these thirty-seven all the languages of the world are made up. The muscles which move the larynx, jaws, tongue, and lips are supplied by the cranial nerves arising in the medulla, and the afferent fibres which make their orderly movement possible arrive at the thalamus. But hearing memory is in the audito-psychic area of the temporal lobe, and the actual framed combinations of voluntary muscle movements which make up spoken words have their centre in the motor speech area of the left hemisphere (in right-handed persons), as already explained. So you may have a disturbance of speech without paralysis of the tongue, throat, or jaw muscles. Such a disturbance is called **aphasia.** We shall mention this subject again when referring to the general functions of the nervous system.

5. **Touch.**—We have already explained the protopathic and epicritic sensory fibres. The former end at the thalamus, and few are found in the internal organs. The latter are arranged in two groups at least, perhaps a great many more. One group goes to the cerebellum and co-ordinates unconsciously the position, tension, and movements of joints, tendons, and muscles; the other goes to the thalamus first, then on to the sensory areas of the cortex, and gives us information as to the quality, nature, or location of stimuli. Certain parts of the body, such as the finger-tips, are richly endowed with epicritic touch endings. Now, the **sense of touch** is not a simple thing, a primary sensation conveyed by one or two sets of fibres, from stimulation of one or two kinds of end-organs in the skin. Touch is, on the other hand, a highly complicated, slowly acquired function of the cerebral cortex, composed of experiences, judgments, memories, and experiments innumerable. The epicritic functions of comparison, localisation, and control, added to the protopathic functions of pressure, pain, and temperature, are only the skin aspects of a very intricate mental process, involving all the sensory and motor functions of the brain. For it is difficult to educate a person without either sight or hearing to discriminate touch sensations; they mean nothing because they have never been explained by experience of other senses. But once this education has been conveyed, then touch becomes a most delicate method of appreciating our surroundings, and it is notorious that the blind have a far more delicate sense of touch because they must constantly practise it, the more usual avenue of sight being cut off.

HOW THE NERVOUS SYSTEM WORKS.

Before proceeding to explain the way in which the nervous system works, and the manner in which its various parts are combined into a functional whole, satisfactory to the needs of the animal, it is necessary to define **reflex action.** In the simplest terms a reflex may be defined as a " motor response to a sensory stimulus." The parts concerned are (1) sensory end-organ; (2) sensory neuron; (3) motor neuron; (4) motor end-organ; there being thus only two neurons in the **reflex arc.** But it is certain that in the higher animals it is never so simple a process. There is always at least one **connector** neuron in the circuit, generally there are many. Likewise, in theory, a reflex action might be supposed to be limited to one segment, say, of the cord. This would be a mistake. In the simplest spinal reflexes many segments are involved. Thus, in the plantar reflex the sole of the foot is stroked and the toes flex, but actually muscles in the thigh contract also, so that at least all the sacral and lumbar segments are concerned. Further, it is very doubtful whether the simplest reflex does not in health spread to higher parts, to the medulla, cerebellum, red nucleus, and even higher. Of course, there are all degrees of complication in reflex action, and sometimes during unconsciousness the most complex and elaborate movements are reflexly performed. In fact, it might be argued that every nerve process is a reflex, but it would be inconvenient to talk of mental processes as such; so we merely say that as we ascend to higher levels responses tend to become less reflex and more voluntary in nature.

This explanation is closely linked up with the recognition of what are called **physiological levels** in the nervous system. The broad theory is that there are various fairly well-defined mechanisms one above the other, the newer and superior higher up, until we reach the pyramidal layers of the brain cortex, and that each one is subject to the authority of the one above it. Thus there was primarily only the cord and medulla level; then, as development proceeded, the midbrain level was added; then the thalamo-striate level; then the polymorphic (infragranular) cortical level; lastly, in man, the pyramidal (supragranular or association) cortical level. As each new level is added it takes supreme control, but leaves it to each lower level to carry out the details of its special functions, just as in a business-house each

department does its own internal work, but important questions are referred to some one higher up, first to the manager, lastly to the directors. The modifications caused by higher control are so marked that it is never possible in health to tell what the functions of any level are; we must resort to animal experiments, or, in man, to diseased states. Under these conditions a good many facts have been discovered by which we may estimate the value of each level when the influence of those above it has been removed.

Cord Level.—After its head has been cut off a fish can swim, a duck paddle, a hen fly—for a few seconds—until the spinal neurons have become exhausted through loss of blood and lack of oxygen. This shows that in lower vertebrates exceedingly complicated automatic movements can be performed by the cord alone. A dog whose upper cord has been severed is completely paralysed for sensation and voluntary movement, but if the hair over the ribs be gently pulled it scratches the place with the correct hind-paw. This shows a quite exact power of localisation in the cord. Man is, however, more accustomed to trust to his brain cortex and pyramidal tracts, and in cases where the upper cord had been completely severed by gunshot wounds, there remained certain reflex reactions. For instance: (1) If the foot were scratched the legs were drawn up—a very primitive defence mechanism; (2) if the upper thigh was stroked the legs were stretched out, and the pelvis attempted to roll over (a sexual reflex); (3) the bladder and bowel emptied themselves when they reached a certain stage of reflex tension. These, then, are some of the lower and primitive functions of the isolated human spinal cord, the patient being unconscious of what was going on and completely deprived of the power of voluntary movement.

Medullary Level.—Here are the **organic reflexes,** a useful term for the vital functions essential to life which reside in the involuntary nervous system—viz., heart movement, respiration, and digestion. In health, these processes are little interfered with by higher levels, but they exercise a profound influence on mind through the thalamus, because they help the endocrine glands to produce emotional states.

Taking the cord and medulla as one, we say broadly that the primitive organic needs and defence mechanisms are placed there, since flexion of the limbs is generally directed towards defence.

Midbrain (Red Nucleus) Level.—If the brain stem be severed between the colliculi the animal adopts a rigid attitude, with limbs extended. If placed in the erect posture, it remains standing, but cannot walk. If, however, the red nucleus and colliculi are intact it can often regain its feet when pushed over. It can swallow, sneeze, and respond reflexly to sounds, for the auditory nerves and their centres are intact. The cerebellum is still in connection with the cord, and the muscles retain their tone, We take it, therefore, that postures, especially those acting against gravity, are maintained by the structures contained in and behind the midbrain, especially by the semicircular canals with their nervous connections. The basal ganglia and cortex having been removed, the animal is, of course, unconscious.

Thalamo-Striate Level.—There is an extensive fibre connection between the red nucleus and thalamus, then on to the striate body, then down again to the red nucleus. This reflex arc is the seat of those automatic movements which the animal performs instinctively through its inherited memory, such as fish swimming, birds flying, and animals running. The thalamus is connected with all the special sense organs and with bodily senses, and in the midbrain just below the thalamus are centres for sympathetic functions, so that animals whose life is built up on this level, such as birds, appear to be leading a very intelligent life. They have their emotions, of fear especially, but also of pleasure; they utter cries which have special meanings; they run about and fly actively, and select the food that suits them with a nice discrimination; they suffer pain, and have an acute sense of touch; but they are very slow in learning by experience, and that they learn at all is due to the fact that they have one or two senses linked up in a small degree to an undifferentiated infragranular type of cerebral cortex. In the thalamo-striate level is a mechanism for reflexly regulating body temperature.

Polymorphic or Infragranular Level.—We are here faced with a great difficulty, for we do not know what part in automatic movement is taken by the striate body and what part by the infragranular cortex. Certain it is that the greater the cortica development, the more complex is a certain part of the striate body (caudate nucleus) and also the larger are the cerebellar hemispheres. But at what point does a movement cease to be automatic and become voluntary? There is no disease which

destroys the whole cortex and leaves the basal ganglia quite healthy, and such an operation on an animal has not been convincingly successful. All we can do is to consider the highest level of all, and leave automatic movements somewhere between supragranular cortex and midbrain.

Pyramidal or Supragranular Level.—At this level lie mind and intellect, the power of storing up memory pictures, not only in all the sensory centres, but in the motor centres as well—the ability, in fact, to profit by experience. How we do this, what are, in short, the laws of mind, will be considered fully in the section on the Mind in Health. Therefore we shall content ourselves with giving a few examples of the motor side of intellect, and of illustrating differences which occur in daily life between automatic and voluntary movements. For, reduced to the lowest figure, life is movement, and the object of movement is life; without movement an animal could not get food, and if all animals were deprived of movement none could help another and all would die. So that movement is actually a process of the mind.

You will notice that all up the central nervous system the same relative position is held by motor and sensory systems. Dorsally situated are the sensory roots in cord and medulla, the thalamus, and behind the fissure of Rolando the sensory (receptive or afferent) brain centres. Ventrally situated, are the motor roots in cord and medulla, the striate body, and in front of the fissure of Rolando the motor (transmitter or efferent) brain centres. A fresh complication in the consideration of function arises from the presence of the corpus callosum, connecting the two hemispheres together. This commissure connects like areas to like, right visuo-sensory to left visuo-sensory, right motor to left motor, and so on, but, so far as we know, it does not connect areas of unlike function, such as right audito-psychic to left motor. Thus, in any given movement or sensation, we never know how far the process is limited to only one hemisphere or to what extent both hemispheres are involved.

One of the best examples of the distinction between automatic and voluntary movements is the woman who can knit hard and read a book at the same time. Another good example is the skilled pianist who, while he plays, can carry on an earnest conversation. A simpler example is walking and talking at one time; but playing a game is an example which interests all

of us. When a cricketer is learning a stroke, he slowly and painfully goes through various carefully thought out, voluntary movements, copying his coach, each part of every movement being interrupted by jerks and painful pauses. When the ball comes along he tries to think how it should be played. By the time he has exercised his judgment and got his muscles to work his wicket is down. The skilled batsman, however, works automatically. From natural (*i.e.*, instinctive) aptitude combined with a careful education of all his association tracts and lower mechanisms, he forms what is actually a " habit." A ball comes along and all the mind memories, sight, muscles, former failures, the coach's gestures, or the colour of his tie, or his accent, and a thousand other memories, are instantly co-ordinated completely outside the batsman's consciousness; all he knows is that a finished picture or " scheme " comes to his conscious mind as " late cut " or " on drive," and when a boundary hit results the reporters praise his judgment. Actually it was his supreme power of substituting an automatic for a voluntary movement. You easily run up or down stairs two steps at a time, because practice has made perfect, but stop and think where you are to put your next foot, and you stumble, you try to substitute voluntary for automatic movement, cortex for striate body, and the result is what is called " physiological error." Unless you had a supragranular brain cortex you could not quickly " learn by experience," could not get your thalamo-striate system into the " habit " of automatic movements. So it has taken the lower animals millions of years to acquire their " instincts," but in man these instincts are so overlaid by recently acquired personal actions that we are surprised when the psychologist analyses, say, such a social custom as shaking hands, and finds in it a primitive defence mechanism, a safeguard against a hostile blow.

Some of the most interesting functions of the cortex are disclosed by a consideration of the disorder called " aphasia," or loss of speech, to which reference has already been made in the paragraph on hearing.

There are several mechanisms concerned in speech. There is the lower mechanism for the movement of the tongue, lips, larynx, and other muscles; and this has at least three components, medullary, midbrain, and cerebellar, depending on the unconscious muscular sensations, tone and balance, as well

as the muscle contractions. Then there is the cortical voluntary mechanism for the same movements; and, lastly, there is the whole range of cortical associations implied in symbolic language. Some of these are ear memory, eye memory, smell and taste memories, bodily-feeling memory, emotional tones associated with each of the above, reflex sight and hearing memories, and memory of former movements of lips and tongue. The sum total of these represents an unconscious intellectual result which is sent to the speech centre from all these other centres, and is there transmuted into conscious movement. Now, in aphasia, there is a greater or lesser loss of the speech function without actual loss of the power of voluntarily moving the muscles involved in speaking. This interference may take many forms, from mere misplacement of words up to an actual inability to recognise the meaning of words heard or seen, with loss of the power of reading and writing; and often the attempt to speak results in a mere jabbering of meaningless jargon. We cannot here go fully into the varieties of the loss of speech or of the nature of the brain injury, but in many cases an aphasic person can speak reflexly what he cannot say voluntarily. For instance, answers to simple questions may result something like this: *Q.* "Fine day." *A.* "Yes, sir" (a reflex habitual answer). *Q.* "What is this?" The patient shakes his head; he knows what it is, but cannot produce the name. *Q.* "Is it a pencil?" He nods. *Q.* "Say pencil." *A.* "I can't say pencil" (nevertheless he has repeated the word reflexly). Or, again, under the influence of sudden or strong emotion, the patient may swear or even speak a sentence which at ordinary times he is unable to utter. Speech, therefore, is a highly intellectual process, but where do we place reflex speech? Is it in the polymorphic layer of the speech centre, or in the opposite hemisphere, or in the striate body? All we can say is that we do not know.

The above are a few examples of the functions of the cerebral cortex, and we may close this section with a summary of the present theory of its action. It is probable that all the cortex, through its multitude of association fibres from every centre, takes part in every thought. The thought may remain merely a mental impression, an intellectual picture, but generally it results in at least some degree of movement. Take, for example, the so-called emotional movements of the muscles of expression in the face which accompany every thought. Even when a man

deliberately " hides his thoughts," this is effected by the muscular action of controlling his expression.

Even if the intellectual picture formed in the mind does not result in any obvious movement, the muscles still unconsciously go through with it to a slight degree. If you, in imagination, hum a tune to yourself, you will feel the throat moving ever so slightly with each note, just as if you actually sang it.

When a movement is to take place, a selected portion of the motor cortex, through the thalamus, releases some lower mechanism, either in the infragranular layers of the cortex or in the striate body. This in turn selectively releases mechanisms in the medulla and cord, though in mammals the pyramidal tract provides a sort of " short circuit " which can release the cord direct. Continuous movement consists really of a series of postures interrupted by successive jerks. The cerebellum " locks " each posture for a fractional space of time, and releases it again for the next jerk, but so rapidly that the resulting movement looks smooth and continuous, just as in the cinema the appearance of continuous motion is obtained by running through a series of isolated pictures in quick succession. In fact, the result of cortical activity is **selective release**, so that lower mechanisms are set free. It is in the supremely varied nature of this selection that the power of the cortex resides. Every sense reception centre, with its stored memories and experiences, is at the service of every other centre, and, however weak and puny the lower mechanisms of man are, compared with those of animals who have lived before him, yet he will rule the world until a greater than he arises in the inevitable course of development, some being with powers still more varied, more able to adapt himself to the ever-changing conditions on the surface of our globe.

SECTION VIII

THE MIND IN HEALTH

Psychology is the scientific study of the mind and of its relation to conduct or behaviour. It is a very difficult study, requiring systematic training, and familiarity with the meaning of many technical words.

The nurse, however, must remember that all those who, either for profit or pleasure, are observers of human nature or judges of character, are to a certain extent psychologists. In our daily conversation, we make use of many of the terms employed in psychology, such as instinct, emotion, consciousness, sensation, perception, ideas, attention, memory, reason, judgment, and will. These names, to which, in the course of our study, we learn to attach definite and precise meanings, are given to attributes or aspects of the mind. But we cannot really know what a person is thinking until he expresses his thoughts in his behaviour. His behaviour is the outward expression of his mind, and in the process of controlling our own behaviour and observing that of others, of analysing their motives and our own, and of adapting ourselves to our particular social circumstances, we are practising the science of psychology, of which the study of behaviour is a very important part.

Modern psychology is really a biological science. This means that man is studied as a member of the animal kingdom, and all the facts of natural history are made use of in the study of the mind.

We may say, then, that this science investigates the development of the mental processes of man as a species of the animal kingdom, as well as their development in the individual and their expression in his behaviour.

The importance of this scientific attitude on the part of the mental nurse cannot be too strongly emphasised. Such an attitude renders it impossible merely to describe the conduct of a mentally disordered person as wicked, irreligious, vicious,

or anti-social. Such terms do not meet the case. The behaviour of the patient is a psychological problem, whose causes must be studied and if possible removed.

Methods of Study.

These may be briefly described under the following headings:

Introspection, which literally means looking into our own minds, and observing and noting their processes and workings. The older studies of the mind—which are generally known as the philosophies or metaphysics—were almost entirely limited to this method of study. Starting from the position that man was a special creation, and mind a strictly human phenomenon without parallel in nature, or supernatural, his mental processes and tendencies were examined from the point of view of his own experiences, by introspection.

Experiment.—Much may be learnt from experimental psychology, which is the setting of certain tasks to ourselves and others and observing how these tasks are performed.

Such experiments, for example, may be directed to finding out how our mental processes are affected by fatigue, how long it takes for fatigue to pass off, or what intervals for rest in the performance of a certain task will produce the best results.

For example: If a man is shovelling coal, it is found that if he uses a large shovel his work has to be broken by longer periods of rest than if he used a smaller shovel. And it may indeed be found that with the smaller shovel more coal is moved, because the necessary intervals for rest are much shorter.

Comparison.—Much light is thrown on man's mental processes by comparing them with those observed in other members of the animal kingdom. We also compare the behaviour of the primitive with that of the civilised races of mankind, and the mental processes of the child in its various stages of growth and development with those of the adult.

Finally, we compare the mind in health with the mind which is defective or disordered.

THE MIND.

It will be asked, "What is the mind?" "What is consciousness?" There are no definite answers to these questions.

We do not know, any more than we know what life itself is.

The utmost we can do is to explain in roundabout ways the natural phenomena to which we attach the terms. It will be helpful to begin with a review of the facts of natural history relative to the mind.

Let us study one of the most simple living creatures, the amœba, a one-celled organism leading a separate existence and found in large numbers in ditch-water (see p. 29).

This little creature adds to its store of vital energy by enveloping and digesting particles of food. Its movement from one place to another is effected by pushing forward one part of the cell and pulling in another. The multiplication of the species is achieved by the division of one cell into two. In this microscopic being, the simplest of all living animals, we observe an impelling need, a continual striving, to preserve and perpetuate itself. It shrinks away from what is harmful and reaches out to what is desirable. If we try to describe what we see when we examine it under a microscope, we shall have to say that it appears to know something about its surroundings, that its own needs and contact with objects outside itself produce in it a state of feeling, and that it performs certain actions with the purpose of supplying its needs and prolonging its existence. These facts, observed in the amœba, are some of the ultimate facts about life for which science offers no explanation, and we see here the most rudimentary form of consciousness and mind expressing itself in behaviour. It requires an effort of the imagination to compare this microscopic creature's reaction to its surroundings with man's consciousness of himself and of nature—its feeble gropings to man's complicated activities; and yet they are similar vital phenomena, differing only in the degree of their complexity. We can only describe the activities of the amœba by using the terms we employ in describing our own mental processes—terms of knowing or **cognition,** of feeling or **affect,** and of striving or **conation.**

EVOLUTION AND ADAPTABILITY.

It is now generally held that the different species of the animal kingdom have gradually developed out of, or evolved from, a simple one-celled form of life such as we have described. This evolution has taken place through countless ages, each species evolving along its own particular lines, the character of its

development depending upon its particular surroundings throughout its history, and the way in which it has been able to adapt itself to these surroundings.

The conditions favourable or unfavourable to life on the surface of the earth have varied very considerably. It appears that marshy swamps have given place to tropical forests; that warm periods have been succeeded by cold periods, when large areas of the earth's surface were covered with ice and snow; and that volcanic upheavals have altered the face of the earth from time to time.

We know from fossil remains that many forms have died out; they have succumbed to climatic conditions, or have been unable to find the food suitable for their existence, or have perished from other hostile causes. Other forms, by the possession of greater adaptability, have managed to persist by changing physically and mentally under the stimulus of changing circumstances. How, why, and when these particular adaptations were achieved by different forms are interesting problems of natural history, throwing light on the study of the mind. Why did some evolve into fishes, some into birds? What led an animal such as the mole to take to the life underground, where it has used its eyes so little that they remain as mere vestiges? What circumstances led to the change in the penguin's wings, with which it is no longer able to fly, but which are used as paddles when it swims under the sea?

Evolution is so slow, and alterations from one generation to another are so inappreciable, that many of these problems now appear insoluble.

Inheritance of the Ancestral Mind.—What is quite clear when we observe successive generations of a species is that like begets like; for example, a young penguin never develops wings for flight, but follows its ancestral habits in the sea. Now, the problems of inheritance are easy to observe when we study a simple one-celled creature. We see it divide into two, each indistinguishable from the other and from the original, and each carrying out the activities of the parent cell in what appears to be precisely the same manner. The ancestral body and mind, as it were, are never out of business, and the mechanism of inheritance can be followed by the eye.

In higher forms of being, complications in the life-history of the individual make this inheritance less readily understood and perceived in detail, although it still exists.

Regard for a moment the life-history of a butterfly. After bewildering metamorphoses from egg to caterpillar and caterpillar to chrysalis, the butterfly emerges, fully equipped, to carry out the activities of its kind without being taught. It is indistinguishable from its ancestors, body and mind. The ancestral tendency to behave in certain ways to maintain the struggle for existence has been transmitted from one generation to another.

The inheritance of the ancestral mind, usually called **instinct,** is readily demonstrated among insects. One generation frequently disappears before the next is hatched out, and in the latter, instinctive adaptation to its surroundings is clearly evident, and perfect of its kind.

Although perfect of its kind, we see that there is practically no capacity for individual changes of behaviour; all the activities of insects are pursued in rigidly narrow ancestral grooves, and only those individuals survive who happen to meet the special circumstances to which they can adapt themselves by nature.

BRAIN, THE SEAT OF CONSCIOUSNESS AND MIND.

When we study a more complicated creature than the amœba, consisting of vast numbers of cells, which have become grouped or specialised into systems and organs related to digestion, locomotion, reproduction, etc., we find that one grouping of cells, known as the nervous system, links up all the other groups, and co-ordinates their various activities. The activities of the nervous system, again, are linked up and co-ordinated by the brain, a mass of cells whose grouping is highly complex, and which resembles the central office of a great telephone service.

The brain is concerned with the functions of mind and consciousness.

As we ascend the scale to the higher animals, with a more highly developed nervous system and a more or less well-developed higher brain, or cerebrum, we see that it is possible for them to store up memories of individual experiences and to profit by the example of others. Generations overlap one another; the young benefit by the teaching of the old; there is an increasing capacity for adaptation to a wider set of circumstances, and instinct is not manifested in the same definite, stereotyped kinds of behaviour. Better equipped with brains,

they can vary their natural adaptations to suit special circumstances. The ancestral mind is more flexible; ancestral habits can be modified by individual habits, and the study of inheritance becomes more obscure.

Infinite degrees of development of a cerebrum, with its possibilities in the way of the expansion of the individual mind and increased adaptability, can be studied among the fishes, birds, and higher animals, and it will be seen how far they have left behind the narrow adaptability of the insects.

Great as is the advance from, let us say, the instinctive mind of a butterfly or a beetle to the more self-conscious individual mind of a horse or a dog, it is a mere step compared to the great gulf which separates the higher animals from man in this respect. Otherwise, man is by no means a remarkable animal; he is physically neither very big nor very strong; his bodily organs and their nervous mechanisms are not in any way peculiar; his organic needs, his appetites and desires, have the same impelling force; and the ancestral mind or instinct plays its part in determining his behaviour. But the enormous development of his cerebrum, with all that it signifies in self-consciousness and in the higher possibilities of mind, places him in a category apart. This cerebrum, with its specialised groups of cells, and with innumerable association fibres connecting all its areas, provides him with the nervous mechanism for enlarging and deepening and specialising his knowledge of himself and of things around him. It enables him to communicate with his fellows by means of words spoken and written, and so to profit by the experience of many successive generations; and to acquire great skill with his hands, so that he can not only adapt himself more perfectly to his surroundings, but can adapt his surroundings to himself. Thus he can successfully carry on the struggle for existence in a very wide range of circumstances—in arctic snows and in tropical heats—and maintain a supreme place in the animal world by the exercise of his intelligence.

It was not until the latter part of the nineteenth century that biological researches led psychologists to emphasise the fact that man is an instinctive creature, like the other animals whom he resembles in the older, deeper parts of the brain called the basal ganglia. It is his highly specialised cerebrum, superimposed as it were on the older parts of his brain, which constitutes the great difference between him and the higher animals.

The ancestral mind, the innate tendencies—his instincts—which have served man as an animal throughout his long struggle for existence, are the essential fabric into which all acquired, individual patterns of character and conduct are woven by his intelligence; they are the driving forces behind all his activities. They are common to all men at all times, though they may vary in intensity in races and individuals. They resemble those of the higher animals, but, as we have already pointed out, they may be so obscured by acquired tendencies and habits of control that their recognition may be difficult. The study of any mind, therefore, must take into consideration the racial and family variations in the intensity of these instinctive tendencies and the circumstances in which the individual was educated. For example, if we set ourselves to study the mind of a savage from Central Africa, we should have to learn something about the story of his race, and how, in the struggle for existence, it has adapted itself to the circumstances of its environment, besides finding out in what special surroundings the savage himself had been nurtured. To compare him with a European born and brought up in a city such as London would be a valuable and interesting psychological investigation, throwing light on the problems of mental inheritance and education. Such investigation would demonstrate that the savage and the civilised were both actuated by essentially the same instinctive tendencies, and that their differences were comparatively superficial, and the result of acquired habits. But we need not go so far afield to find great differences between men. In the same race and in the same country mental characteristics differ almost as greatly as those of the African savage and the European. And the question will arise, By what standard are we to judge a man ? What do we mean by a normal mind ?

THE NORMAL MIND.

For practical purposes "normal" is often taken to be identical with "average," normal height and weight being examples of this usage.

One might say that the normal mind is the mind which resembles the average of those around it. But if we place a great genius in a colony of the feeble-minded, theirs and not his will represent the average mind of that community; furthermore, the average mind of a large community may sometimes express

itself in behaviour of a quite unusual or foolish character, as in the panic of a mob. It will be better to say, then, that the description " normal " as applied to minds depends upon the surroundings to which that mind is required to adjust itself.

When a person can meet the demands commonly made upon him by his material and social surroundings, we say that his mind is normal. When he cannot, or does not, we say that it is abnormal, and society forms colonies for the feeble-minded, because the feeble-minded cannot meet the demands made upon them by normal surroundings. On the other hand, a person may not adjust himself to his surroundings because the surroundings do not seem worth the while, and such a man may attempt to adjust the environment to himself; and in this way may be regarded the actions of those men who have instituted and carried out any important reforms. We may speak of such men as " supernormal," and, similarly, the mentally deficient and the feeble-minded may be described as " subnormal."

It is clear that to the psychologist the interest in behaviour is twofold, and lies not only in the behaviour of the individual, but in the attitude taken by his associates to such behaviour.

THE INSTINCTS.

We shall now proceed to the more detailed study of the processes of the mind, and shall begin with what we have already called the ancestral mind, the inherited or inborn tendencies known as the instincts. As has been said, in some of the lower forms of life, particularly insects, all behaviour is practically instinctive, and there are very small variations in the conduct of individuals. Racial habit and individual habit are identical.

The insect's instinctive behaviour and tendencies of mind fit it for a certain form of life. Its instinctive tendencies have one mode of expression—it is adapted to the preservation and the perpetuation of the species in one particular set of circumstances. It is intelligent in one direction, blind in all others. Perhaps the best example of this is the bee's life in and around its hive.

In man, the instincts are more difficult of recognition, because they do not show themselves in exactly similar kinds of behaviour in every individual. Though they are the essential constituent parts of his mind, without which he would come to a standstill,

like a clock without a spring, his intelligent capacity for increasing his adaptability explains why his instincts are not so uniformly expressed as in the other animals without this capacity. A comparison between the manifestations of the parental instinct in birds and men will illustrate this point. A bird will carry out the complicated work of building a nest for the protection and care of its young without any previous teaching, and each different species of bird will build its own particular kind of nest without much variation from the usual pattern. We recognise that the instinct of parenthood which is behind such behaviour in the bird can be just as strong in man, and that he may experience the same irresistible tendency to care for and protect the young of his own species. But this instinct does not show itself in civilised communities in such stereotyped behaviour as the building of a certain pattern of house with his own hands. When it arises in a young man he may not even recognise it, and indeed may deny its existence. And it may only express itself in his behaviour in various subtle ways which are not apparent to any but the skilful observer.

The recognition of these tendencies in man in their simplest form is a matter of the greatest importance, if we are to form any solid foundation for an investigation of the development of human civilisation. Their elucidation is so difficult that psychologists differ very much in their opinions of what may and may not rightly be classed as instincts.

Some authorities maintain that they may be reduced to three main groups: reproduction, self-preservation, and the instincts of the herd (the social tendencies); but we shall adopt here the more detailed classification of Professor William McDougall.*

He describes these unchanging tendencies which form the basis of human character under two main classes:

I. Special definite tendencies or instincts.

II. General indefinite tendencies arising when mind and mental processes attain a certain degree of complexity in the course of evolution.

The Threefold Aspect of Instinct.—An instinctive process may now be described more closely. Used in the psychological sense, the word "instinct" implies a mental process, and, as we have already said, a mental process has a threefold aspect, which we describe in terms of **knowing (cognition), feeling (affect),** and

* Introduction to "Social Psychology."

striving (conation), ("striving" is an expressive word, which has largely superseded "willing" in this connection).

This is a very useful conception of instinct, and its importance will appear later in the nurse's studies of disordered minds.

The complete definition then is as follows: An instinct is an inborn tendency to perceive and pay attention to objects of a certain class, to experience emotional excitement of a particular quality upon perceiving such objects, and to act in regard to them in a particular manner, or at least to experience an impulse or a desire towards such action.

The word "instinct" is used in daily conversation, without, of course, limiting it to such a very strict definition. For example, it is commonly said that the homing pigeon finds its way home over unknown country by "instinct." Careful investigation into the matter shows that the homing pigeon is usually seeking home in order to attend to its young, from which it has for a time been separated. The deprivation of its young (cognitive aspect) has aroused in it the parental emotion (affective aspect) which urges it to return as quickly as possible in the face of difficulties, danger and fatigue (conative aspect). It finds its way back by the use of its senses and the recognition of well-known landmarks, and the popular use of the term to imply that it is done by some "instinctive" sense of direction over unknown country is a fallacy. If it does not recognise any landmarks—does not know the country—it will be lost.

The conative aspect—that is to say, the bodily accompaniments —of an instinctive process may be readily studied in connection with the instinct of flight and the emotion of fear. Fear arises from an animal's awareness of the approach of danger, and awareness of danger is the memory of experiences which were painful or otherwise harmful to the animal's welfare. This memory need not be a personal one; it may be a racial instinctive one, acquired gradually through many generations. The awareness of the danger is, of course, presented through one or more of the special senses, and the immediate response is a widespread stimulation of the sympathetic nervous system which entirely overpowers the autonomic influence.

This sympathetic stimulation is a slowly acquired ancestral habit calculated to enable the animal to escape by flight or concealment, and it is probable that the physical signs are vestiges of physiological changes that were of great utility; so

that the pupils dilate (to see the danger better), the face is pale (to give more blood to the limbs), the hair stands on end (to frighten the enemy), the heart quickens (to supply more blood to the muscles), the liver discharges glycogen which is carried to the muscles (to supply fuel for flight), digestion and the movements of the intestines cease and the sphincters tighten (to save blood in the abdomen), the eyes and mouth are dry (to save blood in the glands), the attitude is cowering (ready to jump off). If terror be very great the sympathetic influence may be paralysed, so that the sphincters relax and urine or fæces are evacuated, a cold sweat breaks out, and the heart may even stop beating and death occur. The adrenals and thyroid are strongly stimulated, and their secretions help to oxidise sugar in the muscles. But not until these changes have occurred does the animal perceive the emotion of fear; it takes a long time, one or two seconds, before the fear is felt, whereas the bodily changes occur in a fraction of a second. So fear follows and does not, as is popularly supposed, precede the bodily changes.

I. Special Definite Tendencies or Instincts.

McDougall describes eleven principal instincts; seven with their primary emotions, and four which are not so prominently associated with primary emotions, but which provide important impulses that have a bearing on our social life. These are:

1. The instinct of flight and the emotion of fear.
2. The instinct of repulsion and the emotion of disgust.
3. The instinct of curiosity and the emotion of wonder.
4. The instinct of pugnacity and the emotion of anger.
5. The instinct of self-assertion and the emotion of elation.
6. The instinct of self-abasement and the emotion of subjection.
7. The parental instinct and the tender emotion.
8. The instinct of reproduction.
9. The gregarious instinct.
10. The instinct of acquisition.
11. The instinct of construction.

He says: "The instincts enumerated above, together with a number of minor instincts, such as those that prompt to crawling and walking, are, I think, all that we can recognise with certainty in the constitution of the human mind. Lightly to postulate an indefinite number and variety of human instincts

is a cheap way to solve psychological problems, and is an error hardly less serious and less common than the opposite error of ignoring all the instincts."

These instincts are not all apparent in the child, and they make their appearance at various stages of the individual's development. The very young infant shows only a few simple instinctive tendencies, such as sucking, crawling, crying and winking, and shrinking from a blow. These are not associated with any very definite states of feeling to which we can attach specific names. In the principal instincts, however, which develop later in the life of the child, the arousing of the instinct is always accompanied by such definite states of feeling that we are accustomed to attach particular names to them which are familiar to us all; and to these states of feeling—fear, curiosity, anger, and the like—we give the general name **emotions.**

We can only study these instincts very briefly here. The most we can do is to indicate in a general way what objects arouse them, and what is the nature of the emotions that accompany them, and give a general indication of the special importance of each in our social life.

1. **The Instinct of Flight and the Emotion of Fear.**—This instinct is aroused in a great number of ways. Any sudden loud noise will frighten most children, and, indeed, most grown-up people; and the presence of animals is sometimes sufficient to cause alarm. Some people never overcome their instinctive fear of a thunder-storm, a high wind, and, generally speaking, anything strange or unusual. The emotion of fear need not be described; it must have been experienced by all.

In most animals it is followed by flight, and after flight there is usually a tendency to instinctive concealment. This double tendency of flight and concealment accounts for the different symptoms shown by persons suffering from fear. The rapid pulse and quick breathing experienced by some correspond to the impulse to flight; in others the stopping of the heart and the paralysis of movement may be explained as the expression of the impulse to concealment. It is obvious how necessary this instinct is for the safety of living creatures. It is so powerful that it can impel an animal to rapid and violent action which it may otherwise be quite incapable of performing.

This primitive instinct of fear can be traced through many intellectual developments in man. It plays its part in main-

taining his social discipline, and enters largely into his religious awe and reverence before the unknown and mysterious.

2. **The Instinct of Repulsion and the Emotion of Disgust.**—This instinct is aroused by many objects offensive to the senses. It is illustrated by the way we reject from the mouth anything whose taste or smell is objectionable, and shrink from or cast aside anything which is slippery or slimy to the touch. Like fear, the emotion of disgust is one of aversion, and along with fear, probably accounts for all our aversions. It has most likely arisen in man at some stage in his history from the constant necessity of avoiding unsuitable foods, and the presence of reptiles. It can be traced in our instinctive dislike to certain people, whom we call "slippery customers" or "offensive fellows."

3. **The Instinct of Curiosity and the Emotion of Wonder.**—The impulse aroused by curiosity is to approach and examine more closely the object that excites it, which seems to be something similar to, yet perceptibly different from, some familiar object. The sight of a completely unfamiliar object tends merely to induce fear. But the difference between the two excitants is mainly one of degree, a smaller element of strangeness causing curiosity, a larger element alarm. Sometimes both are present, as when we see a dog approaching and retreating from some object, alternately drawn by curiosity and repelled by fear.

Curiosity is not an instinct very necessary for the preservation of the individual; indeed, it might often lead him to take unnecessary risks. It varies greatly in strength between one individual and another. But it may be developed, and in our social life it is probably the main impulse behind such activities as scientific research.

4. **The Instinct of Pugnacity and the Emotion of Anger.**—This instinct cannot be said to have any particular excitant. It may be aroused by anything which offers opposition to the exercise of other impulses caused by other instincts. Its tendencies are opposed to those of fear, which may be said to inhibit all activities which are not directed to the end of escaping from the dreaded object. The emotion of anger, however, impels a person to break down any opposition to the exercise of any of his instincts, and in this way pugnacity may be said to reinforce the other instincts. Rightly directed, it provides the driving-force for much of the good work which is done in the world.

5. **The Instinct of Self-Assertion and the Emotion of Elation.**—These can be easily recognised in animals and young people. The instinct is a social one, and is aroused by the presence of others, and we may trace its development in the child, through all the boastfulness and love of display that characterise the adolescent, until it crystallises into the steady determination to realise himself worthily, which we call self-respect, dignity, or independence.

6. **The Instinct of Self-Abasement and the Emotion of Subjection.**—This instinct explains much of the behaviour of animals and young children. In disordered states of the mind, it may be seen in operation, uncontrolled by the intelligence, in the familiar type of case characterised by depression and delusions of unworthiness.

7. **The Parental Instinct and the Tender Emotion.**—These which are common to animals and man operate for the preservation of the species. They are extremely powerful, and can overcome even the impulse of fear. They are the basis of our whole family life, and lie at the root of the great virtues of benevolence, pity, and generosity.

8. **The Instinct of Reproduction.**—This is of profound importance, and its use to the species is obvious. It bears witness, probably more powerfully than any other instinct, to man's intimate relation to the animal kingdom. In his civilisation, although its impulses are often intellectualised and changed, and may be obscure and unconscious, it probably dominates and energises our activities to a unique extent.

9. **The Gregarious Instinct.**—This instinct, sometimes called the herd instinct, can be readily recognised in our inability to live without the comfort which the presence of other people produces in us. We have no particular name for its emotion. Its absence is very noticeable in some forms of mental disorder.

10. **The Instinct of Acquisition.**—The tendency to collect and hoard up various objects is common to all human beings. This seems to be truly instinctive, and it may be exaggerated in cases of mental disturbance. Under the guidance of the intellect we see its display in the formation of private museums and picture galleries or in the skill by which large fortunes are amassed.

11. **The Instinct of Construction.**—This can be observed in the play of children, and can be traced throughout their develop-

ment and in later life. It is displayed in all kinds of organisation, administration and construction.

A feeding instinct appears to be innate in some animals, although in man it becomes so greatly modified by training and experience that nothing but the organic impulse of hunger remains to remind us that it is an instinctive process.

It will be necessary here to indicate how in man the operation of the instincts may be modified in several ways by his complex intellectual development. They may be brought into play, not only by objects which may be said to be their natural excitants, but also by the idea of such objects, and by perceptions and ideas of objects associated with them in the mind.

Again, several instincts may be excited at the same time, and their several manifestations may be blended in a variety of ways. The wider the range of the mind the more striking these modifications will be, and the more difficult will it become to unravel the different instinctive processes, and find out the part which each plays. The behaviour in which they express themselves may be extremely complicated, and modified in every individual case by acquired habits of thought and action.

The point to be emphasised here, however, is that, although civilised man learns to control the actions to which he is prompted by his instincts, he cannot avoid the emotions aroused by these instincts.

This is very well illustrated in our everyday psychology in the emotion of anger.

When the instinct of pugnacity is aroused, we may school ourselves to act with forbearance, but we cannot avoid the emotion of anger, and it is a commonplace observation that a man who has been annoyed by one incident and has succeeded in behaving calmly, may remain irritated and cantankerous for the rest of the day, and find a vent for his emotion on people who have not offended him, or even on inanimate objects.

The blending of these primary emotions gives rise to **complex emotional states** to which we give special names; for example, **admiration,** which is a true emotion, though certainly not a primary one. It implies a considerable degree of mental development, and it seems to be a compound of the primary emotions of wonder and subjection. Again, the blending of this complex emotion of admiration with the primary emotion of fear gives

rise to the compound emotion of **awe.** **Scorn** appears to be a blending of the primary emotions of disgust and anger.

Fear and disgust blend into the compound of **loathing,** and loathing complicated by the primary emotion of wonder may produce a highly compound emotional state to which the name **fascination** might be applied. Other very complex emotional states arising out of combinations of the primary emotions are **reverence, gratitude, envy.**

The Sentiments.

The grouping of these complex emotions about certain objects results in the formation of what we call the "sentiments," and a definition of this term in the modern technical sense may be expressed as follows: A sentiment is an enduring system of emotional tendencies grouped about some object. Typical sentiments are **love, hate,** and **pride.**

Such objects, for instance, as a man's regiment, his child, his ship, his village or town, may arouse not one single emotion, but a whole system of emotions; and, moreover, not only the object itself, but the mere idea of it may do so.

For example, the primary emotion awakened in the parent by the presence of the child or even the thought of the child is the tender emotion. But many other emotions may be grouped around the idea of the child—elation in its possession, fear of possible danger to it, anger at any interference with it. These emotions may be aroused from time to time, but the results of these tendencies are the enduring sentiments of affection and pride with which the parent constantly regards the child.

Again, one man may often rouse the emotions of aversion and anger in us, but the enduring sentiment we have for him is hate. We may fear him from time to time, and be indignant with him on specific occasions, but the sentiment we have towards him is hate.

The Organisation of the Sentiments.

Will.—It is clear that, if the sentiments operated separately, they might not lead to efficient behaviour. Any man who acted at the prompting of a single sentiment as soon as it was aroused, without reflecting upon the rightness of his action, might be judged by society to be a mere sentimentalist, or perhaps worse, a delinquent.

In a strongly developed moral character there is a certain subordination of some sentiments to others, while some are organised and welded together into still more complicated sentiments.

One of the most important of these complicated sentiments results from the grouping of emotional tendencies around a man's idea of himself and all that his self involves. It may, and usually does, include his idea of himself, his possessions, his wife and family, and his nation, this idea being formed to a certain extent under the influence of the ideas of other people with whom he is associated on the same matter. This, which is called the "self-regarding sentiment," is perhaps the most powerful influence in guiding and determining our conduct.

It is this idea of himself, this sentiment, which determines for a man what he may or may not do under a given set of circumstances. Suppose a man has two different instinctive impulses to action in a certain situation, one of which is stronger than the other, he cannot be said to exercise an act of will when he follows the stronger impulse. If, however, he throws in the weight of his "self-regarding sentiment" on the side of the less powerful impulse and acts accordingly, he is said to exercise an act of will.

We see, then, how closely the problem of will is bound up in the problem of instinct.

In the study of the mind and conduct, the importance of understanding the sentiments becomes increasingly clear, for it is they which control the instinctive impulses, though their effective force is itself derived from instinct.

II. General Indefinite Tendencies.

We shall now describe the more prominent of the second group of tendencies, those "arising when mind and mental processes attain a certain degree of complexity in the course of evolution."

1. Suggestibility.
2. Play (rivalry).
3. Habit.

1. **Suggestibility.**—This shows itself in a general susceptibility to impressions from others in regard to thought, feeling, and action. It may be considered under the three aspects of mental processes, though it is clear that they cannot be dissociated in experience.

(*a*) *Cognitive suggestibility*, a tendency for the human mind to accept something communicated to it as a fact in the absence of any real grounds for its acceptance.

(*b*) *Affective suggestibility*, the sympathetic induction of the emotions, the human tendency to share the emotions of others, or to sympathise, to use the word in its strict meaning.

(*c*) *Conative suggestibility*, a tendency to imitate the actions of those around us.

Examples of these tendencies may readily be discerned in the behaviour of crowds. Among the lower animals, who live in herds or flocks, this suggestibility will be of great use to the community. A common instance is the way in which sheep will follow their leader over a gate. This tendency is of great use to a flock in a wild state; those coming after, who cannot see the obstacle to be surmounted, instinctively imitate those who go in front.

2. **Play (Rivalry).**—The tendency to play is observed among children and the young of many animals. This tendency has given rise to much discussion, but its use as training for the future life of the individual is obvious.

3. **Habit.**—Actions are more easily carried out because they have previously been performed. There is an innate tendency in human beings, both in thought and action, to create beaten tracks for themselves, which they follow with increasing ease, and which are called habits.

HABITS.

We may now distinguish between an instinct and a habit in man. An instinct is common to all (though the degree of intensity may vary in individuals), and it is inborn. A habit is peculiar to oneself and is acquired during one's lifetime. An instinct is a tendency to behave in a general way, whereas a habit is usually a tendency to behave in a definite way in definite situations. But it must not be forgotten that behind a habit there is the driving force of some instinct, and the chief troubles in many of the milder kinds of mental disorder can be attributed very largely to habits of thought or action arising out of certain instincts. Their treatment consists, first of all, in helping the patient to break the undesirable habit by removing him from the situation which has provoked the instincts involved; secondly,

encouraging the formation of new habits connected with some other instinct which is strong enough to insure their permanency.

Some reference must be made here to three general terms which are used with reference to the mind: temperament, disposition, and character.

Temperament.—Psychologists used to classify man in accordance with what they called "temperament," and the word denoted a particular mental attitude which was more or less noticeable throughout the life of the individual. Among others, for example, were described the sanguine or hopeful temperament, the nervous temperament, and the bilious or gloomy temperament.

Modern investigations do not support any very definite classification of this sort. Individuals certainly differ in their outlook upon life. Some are cheery and optimistic, some are gloomy, even when their intelligence protests against gloom. To some extent, however, this is the general result of the physical constitution and of various organic sensations. When we consider the proverbially hopeful mood of the consumptive patient, or the effect on the mind of permanent or temporary changes in the chemistry of the blood due to drugs or disease, we see that organic sensations have a great deal to do with colouring, so to speak, a person's habitual outlook, and play a great part in creating or destroying the sense of well-being, which cannot but affect the mental attitude.

Disposition.—Although we often fail to distinguish disposition from temperament, there is a distinction. A person's disposition is the result of inborn variations in the strength of his different instincts. For example, we speak of a "timid" or of an "inquiring" disposition.

The extent to which temperament and disposition may be modified by the individual's intelligence cannot at present be clearly defined.

Character.—By character we mean the mental and moral equipment which a man acquires from his education and environment, and which he displays in the conduct of his affairs and in his relations with his fellow-man. It is gradually built up by the exercise of his intelligence upon the promptings of temperament and disposition, and its formation is largely in his own hands.

BEHAVIOUR AND CONDUCT.

In describing the instincts, emphasis has been laid on the three aspects of all mental processes, knowing, feeling, and striving—or, to use the technical terms, cognition, affect, and conation. So far we have chiefly dealt with the affective or emotional aspect, and, in a less degree, with the striving or conative aspect. To conation—the actions of living creatures under the influence of their emotions—we give the general name **behaviour.**

When we speak of self-conscious and rational human beings whose behaviour is modified by the organisation of sentiments, and by intelligent choice of action, we use the term " conduct." **Conduct** may be defined as the highest type of behaviour, the deliberate, self-conscious, and coherent choice of modes of action.

THE STUDY OF CONSCIOUSNESS.

Let us now consider the cognitive aspect of mental processes.

The consciousness, or awareness, that living creatures possess of themselves and of the outside world, varies greatly in degree throughout the animal kingdom; in man, with his highly developed nervous system with its specialised groups of cells, we are able to differentiate this consciousness into different forms of sensation.

These sensations may be described under three headings: (1) Common sensations; (2) special sense sensations; (3) organic sensations.

Common Sensations.—By means of nerve terminations in the skin we are able to appreciate degrees of pain, heat, and cold.

Special Sense Sensations.—By means of our special sense organs in the eye, ear, nose, tongue, and skin, we experience the sensation of sight, hearing, smell, taste, and touch.

Organic sensations are derived from our various organs: alimentary system (hunger, thirst, nausea), circulatory system, respiratory system, reproductive system, muscles, tendons, articular surfaces, etc. These sensations are more diffuse and less clearly defined in our consciousness than the other groups of sensation, and are closely connected with our general sense of well-being or discomfort.

Perception.—This is the process by which we distinguish external objects from one another, according to the different sensations they produce in us. It is probable that this is the simplest form of consciousness, and that we form the perceptions before we completely analyse the sensations.

For example, a piece of cloth on which there is a certain pattern of red, white, and blue is recognised by me as a Union Jack. Clearly, a very young child might learn to call that flag by name, without being able to single out and speak of the separate colours that compose it, or refer to the harsh feeling of the bunting, or the flapping sound which it makes in the wind. It is later on, as a result of special education, that he finds out just what part in this perception is played by the respective sensations of sight and touch and hearing. If, for the sake of simplicity, we say that a percept is made up of sensations plus their meaning, this does not mean that the child first distinguishes or sorts out all his sensations, and that perception follows. Rather, the dim awareness of objects precedes the recognition of their detail.

Mental Images.—Now I may recall to my mind's eye on another day an experience which resembles to some extent that in which I perceived the Union Jack. I am now said to be imaging, not perceiving the flag. The difference between a percept and an image is usually very sharp, but almost anyone can recount instances in which the image has been taken for percept. For example, if one is anxiously straining one's ears for the sound of a distant bell in the hospital, it is quite possible that an image of hearing may appear to be a real perception of the sound.

This experience happens nightly to many of us in the form of dreams, when our images are usually (though not always) mistaken for percepts. Hallucinations are very striking examples of this fact.

Ideas.—Images connected with all the senses may be revived in the mind; images of touch, warmth, cold, and pain, of taste and smell, and of the organic sensations such as hunger, nausea, etc.

These images revived in the mind carry a meaning, and the meaning of the image may be more important than the image itself. For example, the meaning which the image of my country's flag conveys to my mind is of infinitely more importance to me than the recalling of the sensations produced by an

oblong piece of cloth coloured in a particular way. To the image, plus its meaning, is given the name **idea.**

Attention.—At a given time we may be aware with more or less clearness of our experience. This may be illustrated by an example: If a player is carefully watching the flight of a tennis-ball in order to return it into the proper part of the court, his experience of the ball is likely to stand out clearly focussed, while other experiences, such as that of the warmth of the sun or the flight of a passing bird, will be much less distinct. He is said to be attending to the ball, and his mental process may be compared to that of a lens which concentrates the rays of light which fall upon it into a brilliant focus, at the expense of a surrounding area which, lighted dimly, is called the margin.

Now the tennis player while he is attending *to* the ball may be attending *away from* some insistent experience such as an uncomfortable shoe, or a blistered hand, and the more closely he attends to the ball, the less clear will be his experience of these marginal events. In other words, it is possible that the simplest act of attention to any one present experience involves a process of repression of other experiences.

Memory.—Memory may be most usefully defined as the recall of past experiences.

An act of recollection implies that the experience was impressed on the mind and was retained there.

Inability to remember an experience may be due to the fact that little attention was paid to the matter at the time, possibly because the mind was busy with other things. Therefore to a superficial observer a man may appear to have lost his memory for a certain event when the fact is that the experiences were never impressed upon his mind.

Some defects of memory, however, are real disorders of retention depending on the fact that the nervous tissue has undergone such change that it can no longer retain the impressions made upon it. This is the case in old age, when the nervous tissue can no longer retain new impressions, though the memory for remote events may be still quite good.

Inability to remember is, however, often due to a defect in the power of recall. There is no doubt that the average healthy mind tends usually to select for recall acceptable or pleasant experiences rather than their opposites. In some cases this process may go so far that the unacceptable experience, and along

with it other experiences which might serve by association to recall it, are repressed.

Such exiled experiences, however, may recur to the mind if at any time these selective forces are relaxed, as may occur under the stress of a great emotion, during fatigue, or intoxication by fever or drugs, such as alcohol, or at critical periods of life when important bodily changes are taking place, or most commonly of all in normal sleep (dreams).

Different Kinds of Memory.—For many people experiences are recalled in the " mind's eye," or, to use the common psychological term, in **visual images.** Others more easily recall experiences of hearing—**auditory images,** for example, words spoken by themselves or others, noises, tones, or music. Others may remember in the " mind's muscles." In thinking of a summer holiday, they recollect, not the appearance of the sea and sands, nor the splash of the waves, but the sensations in their limbs as they swam or rowed or played.

ASSOCIATION OF IDEAS.

The idea may be said to be the unit of thinking; and thinking is the mental process of reviving in the mind ideas whose meanings are related to one another in various ways. They may be related by their similarity. For example, to think of the Union Jack may remind me of the tricolour of France. Or they may be related by their dissimilarity. For example, the idea of black may be followed by the idea of white. Or the experience which gave rise to one idea may have occurred simultaneously with another experience, the idea of which is, therefore, connected with the first idea by an association of time. If, for example, while I am looking at the flag, a telegram containing bad news is brought to me, the idea of the flag in future will tend to recall that bad news to my mind. Again, two ideas may suggest each other because the experiences behind them, though not simultaneous, followed one another closely. Or meanings may be related in a variety of ways, such as that of cause and effect (*e.g.*, lightning and thunder), greater and smaller (*e.g.*, ton and hundredweight), general truth and concrete example (*e.g.*, birds fly. The thrush, being a bird, flies).

This activity of the mind, which brings the meanings of revived experiences into relation with one another, points to the fact that

our processes of thought do not occur haphazard, but in definite mental patterns, and those patterns depend upon the directive tendencies which are prominent in the mind at any moment. The individual may be clearly or only dimly conscious of these directive tendencies. It was said of a great shipbuilder, who had much to do with the development of the Transatlantic liner, that he could not address a public meeting on any subject whatever without sooner or later coming back to the subject which had preoccupied him all his life—viz., " a big ship."

To say, then, that one idea calls up another in the mind is to explain nothing, but if we can relate such a calling up to some directive tendency temporarily existing in the mind we are nearer to an explanation, and this will make clearer a distinction which has been made by some writers between **free** and **directed association.** An example will illustrate this point: If a man looking at his blotting-pad notices that it is thick, pink, oblong, new, and absorbent, this expression of the workings of his mind may not seem unusual either to himself or to another. But if on glancing at it he should remark, " pink, sweet pea, flower show, Wales, Criccieth, Prime Minister, politics, housing problem, huts, Pacific Islands," a spectator's comment might be that the list sounded like the ravings of a madman. It is improbable that he would realise how near to an accurate statement of fact he had been, and that the difference between a sane man's directed association and the maniac's apparently free association is merely one of degree. The first list above was compiled by allowing the blotting-pad to dominate the thinker's mind; the second, by employing the blotting-pad simply as a launching-place for the memories which were then allowed to run freely.

But were these memories " free ?" To the ordinary English reader of this article, the connections between the last six of them should be obvious enough. To the thinker himself, the other connections are traceable to personal memories. All that is meant here by " free " is that the tendencies directing the path of association of the ideas in the mind at the time are less easily discovered. Instead of one main idea—the blotting-pad—dominating the flow of thought, the direction was taken over in turn by several subjects—by holidays in Wales, politics, and the solution of the housing problems in this country and elsewhere. This **free association** occurs whenever there is removed from our minds the dominating influence of some

conscious guiding idea such as that of the blotting-pad in the above example.

But it should be clear that in the second case, too, the associations were guided, although not by one idea alone, nor by ideas of which the thinker was clearly aware.

Now let us suppose that such an experiment were carried out by a person whose mind at the time was dominated by some great emotional experience, a great love or sorrow. It is quite possible that, no matter what was the starting-point of his thoughts, they would tend to finish upon the subject of his preoccupation, even though he tried his hardest to prevent them from so doing.

This makes it possible to suppose that our mind, even when we think it is running quite freely, as in reverie or dreams, is really being dominated by some pattern of which we are not clearly aware; in other words, that no ideas can ever arise in our mind by chance. Moreover, it is believed by some that if we had known completely the mental circumstances which preceded the rising in consciousness of any thought whatever, we could have predicted its appearance. Now, whether this belief that nothing can happen in the mind by chance be true or not, it has undoubtedly been of the greatest value in helping us to understand disordered minds. A person may be acting under the influence of instinct, and may carry out some train of action which is successfully adapted to the immediate circumstances, though at the time he does not know the reason for it. At the other end of the scale we have such an example as that of a person thinking logically and acting under the influence of a strict scientific education, whose every thought is directed and guided by those which have gone before. Usually, however, our thinking would come somewhere between these two types. This is commonly shown in many cases in which we do something which proves to be justifiable or reasonable, but the reasons for which we cannot put satisfactorily into words.

It is probable, in the case of a person who has been normally brought up and educated, and who is in good bodily and mental health, that the later patterns of directive tendencies (acquired during his education), which we call reasonable, dominate the earlier ones, which we call instinctive. But under great stress, or in disease, the earlier more childish tendencies are apt to assert themselves; and when we say of a patient that he is

behaving like a child, we are probably describing a very real occurrence and not using a fanciful comparison.

Any assertion that a particular man thinks foolishly or dreams absurdities has not very much significance for the psychologist, who is just as anxious to discover the reason for an absurd thought or action as for those which would be described as rational or sensible by the person's immediate spectators.

This belief has led to very valuable results, for by employing the process of "free association," it has been possible to trace the presence in the patient's mind of troubles, of the real nature of which he himself was only partially aware.

If he is persuaded to put himself into a mental condition in which he allows thoughts to enter his mind quite regardless of their nature and uncriticised, it is found that many of the repressed troubles will arise in consciousness in these conditions.

It is probable that this state resembles those which occur under hypnosis, alcoholic intoxication, and in sleep, and this because they all have one aspect in common—viz., that the directive tendencies are unconscious, or only partly conscious, whereas in the normal waking state their nature was more clearly obvious to the person.

These and similar methods of investigation constitute **psychological analysis.** It is in the psychoneuroses, the group of disorders commonly called by such names as hysteria, neurasthenia, nervous breakdown or "nerves," that analytical methods have met with their great successes. Hitherto, as their use amongst the psychoses—the insanities proper—has been relatively small, we are not justified in assuming that they will be successful when applied to the graver disorders of the mind. Moreover, a patient is unlikely to arrive at a hospital for the insane until his condition is so serious that he himself will be unable to give the necessary material assistance in this line of treatment.

REASON AND JUDGMENT.

The complexity of man's consciousness and his power to recall his past experiences enable him to guide his conduct in ways which are not possible to the lower animals. He can bring cause and effect into relation, which mental process we call **reason.** He can compare different experiences and different modes of

behaviour, in the light of their value to him, which mental process we call **judgment.**

If, as so frequently happens, we are faced with two alternatives of conduct, we may act according to our instincts, taking the path which is more pleasant. On the other hand, from past experience, we may judge that to deprive ourselves of present pleasure may be to our greater benefit in the future. That is to say, we have judged the two lines of conduct; we have associated these judgments by a process of reasoning, and have chosen our line of conduct in the light of reason. The above is an example, and is not meant to imply that in many instances a line of conduct which is instinctive may not also be judged to be the most reasonable, but that a healthy and intelligent man should be able to regulate his conduct according to the dictates of reason; and that all problems which can be solved by reasonable means should be so solved.

As we have already seen, however, most of the important decisions in life fall into a vast intermediate group in which one acts neither from instinct nor from reason, but from **sentiment.**

Such conduct, though not dictated by reason, may and often does appear reasonable to an outsider, and after, or even before the fact, the man himself may invent reasons for it which are perfectly satisfactory to himself. This, very commonly seen in disordered mental states, is sometimes termed **rationalisation.**

Now the sentiments are systems of emotional tendencies, and the emotions are the affective side of the instincts. Thus through the sentiments instinct and reason come into close connection. Reason alone cannot be relied upon to regulate conduct, and in proportion as a man's loves and hates are directed towards worthy or unworthy things respectively, his conduct tends to be socially desirable or undesirable.

Conflicts.—It is not difficult to understand that the sentiments may prompt us at times to conflicting behaviour, as happens often in the case of love and duty. Again, the total effect of two or more sentiments which have previously "pulled together," so to speak, may be modified by some change in the nature of one of them. Such a change may lead to the greatest disorders and disabilities in conduct; for example, we know how a man's interest in his life's work may dwindle if his affection for his leader should turn to hatred. Such disorder among the sentiments gives rise to what are termed **conflicts.**

Mental healing consists largely in discovering and disentangling these conflicts, and re-establishing a mental harmony which may guide conduct more effectively. This latter process is often termed **re-education.**

SUBCONSCIOUSNESS OR THE UNCONSCIOUS MIND.

This is a subject too complex to be treated satisfactorily within the limits of a short textbook. Its difficulty is increased by the fact that different writers have attributed different meanings to the term "subconscious," but the main central idea underlying discussion on the subject has been introduced in the example of the tennis player. It is that at any time we may be aware with more or less clearness of the various items of our experience, and that we may repress from our consciousness any item to which we do not wish to pay attention. Further, we are trained from childhood to check certain tendencies which are not for the greatest good of ourselves or those about us, and to replace them by others which are more desirable. Take the behaviour of a child; it is obvious that the young child offends against society just as many of our patients in a mental hospital do. His personal habits are dirty, he is noisy, he bolts his food and sometimes refuses it, and he is extremely selfish. As a result of the process of training, however, he ceases to show these undesirable tendencies, and later he may become completely unaware of their existence in him. Nevertheless, they have not vanished—training does not remove them, but merely deals with them so that they cannot express themselves directly in the child's conduct, and the knowledge of their existence passes altogether from his consciousness. As the result of this process of **repression,** the undesirable ideas and tendencies are forced into what is called the "unconscious mind." It is not suggested that all training is merely a process of repression, but much of it certainly is, and it forms a good enough illustration for the subject. Exactly the same process of repression is seen in our everyday life. Many persons, when confronted with an unpleasant idea, are unable to face the thing as it is, and tend to avoid painful reality by a process of repression. This is specially the case in persons who are likely to be the subjects of mental and nervous disorder, but instances of the process abound in the lives of all; for example, our own view of our

character or appearance compared with what our friends think about us shows that we can be blind to facts obvious to everyone else. Or, to take a simpler example, the accounts of an angry discussion and quarrel, as given by the two disputants, are generally so totally opposed to each other that one wonders what the truth really is. Each of the parties is very possibly telling the truth as he sees it, but the tendency to remember and emphasise points in which he was successful, and to gloss over and neglect those in which he was in the wrong and had the worst of it, is so strong that the latter become readily forgotten and the speaker appears quite unconscious that they ever occurred. Now all these unpleasant memories, abandoned hopes, repressed tendencies, and the like, are not done away with, but remain with much else in what we call the "unconscious mind"; and this is the point to be grasped, that there is in our minds a storehouse of memories, ideas, wishes, and the like—some say of every experience that ever happened to us—of the very existence of which we are quite unaware, but which may exercise a very powerful effect upon our opinions and behaviour.

Repression is not to be confused with ordinary temporary forgetfulness. At the moment I am not aware of what I was doing yesterday at 3 o'clock in the afternoon, but this memory is not, so to speak, far below the surface, and if I think of what I was doing yesterday morning I can pass from memory to memory by virtue of association of ideas, which has already been explained, until the chain of association leads me to what I was doing at 3 o'clock. Repression, however, amounts to a block in this chain of association which prevents some particular memory from coming up to consciousness again in the ordinary way.

Sleep and Dreams.—The true nature of sleep is not understood. Our bodily mechanism appears to follow a definite cycle; periods of activity are succeeded by periods of fatigue and repose. During profound sleep all man's higher mental processes cease, and there is an opportunity for his higher nervous mechanism to recuperate.

There are, however, various depths of unconsciousness in sleep, and in some of the less profound states **dreams** are common. In this condition, since the higher controlling selective mental processes are not at work, ideas that have been repressed into the unconscious may enter the partially conscious mind. Much

has been written of recent years about dreams, and it is held that such repressed ideas frequently enter the dream mind in a distorted and unrecognisable form. The idea in a dream may clothe itself with material derived from the sleeper's memory of the incidents and experiences of the day, or it may express itself in a dramatic and symbolic form to the mind of the dreamer. By an interesting but difficult process of analysis, it can often be shown that the real essence of a dream lies in some tendency, idea, or wish of the dreamer which has been repressed and thus finds an outlet. By this analysis of dreams, many of the obscure mental troubles of those suffering from the milder mental disorders can be discovered and successfully treated.

THE PSYCHOLOGICAL ASPECT OF MENTAL SYMPTOMS.

One of the earliest and greatest difficulties of the mental nurse is to find any cause or explanation of the various mental symptoms shown by patients. We learn what is meant by a delusion, for example, but our definition fails to explain to us how and why a patient's mind should so work as to bring about a firm conviction of something utterly opposed to fact. Again, merely to say that a hallucination is a perception without an object is no answer to such questions as why a patient should have hallucinations at all, how they arise, or why one patient should be comforted by angel voices while another is tormented by the threats of fiends. It is only in comparatively recent years that any real success has been achieved in the effort to understand the actual working of the patient's mind, and the real causes underlying his insane conduct. The success obtained is very small in comparison with the immense amount of work still to be done, but even an elementary knowledge of the way in which the matter has been most successfully approached is of immense assistance in helping us to understand our patients, and adds infinitely to the interest of our work. Certainly a book of this kind would be incomplete without a summary of this psychological conception, as it may be called, of mental symptoms.

The acts and symptoms of our patients which puzzle us most are those which we feel that we have never in any degree experienced ourselves, and for which we can find nothing which we can regard as a sufficient cause. We can enter sufficiently into the feelings of the mildly excited or depressed case to

perceive that they represent merely a very exaggerated degree of what we have all felt at one time or another, and we can understand how a poison, such as alcohol taken to excess, may injure the structure of the brain and thus produce mental symptoms. The difficulty, however, lies in the attempt to explain why the mental symptoms should take the particular form they do; why a patient, apparently well in every other respect, should believe himself to be dead, why a patient should wash his hands fifty times a day when they are perfectly clean, why a patient should spend his life in writing letters to the newspapers about an imaginary conspiracy, and so on.

We very soon learn that it is useless to ask the patient why he does any of these things, because his answer will never help us towards the real reason, and it may be said at once that in this respect he is no worse than the rest of us. It is in the nature of all of us to imagine ourselves completely logical and reasoning beings and to think that we can give clear reasons for all we do. In a very great number of cases, however, reflection will convince us that the reasons we give, and in which we have thoroughly believed, are not real reasons at all, but only justifications or excuses for what we have done, and are only thought of after the event, being what we have called rationalisations. To take a simple example: I am asked if I like some official about the place, and I reply at once to the effect that I dislike him very heartily. When I am asked why, I may, if I am very honest with myself, say quite frankly that I do not know, although as a matter of fact even this is not quite accurately true, as we shall see. As a general rule, however, I give a series of reasons for my dislike, such as that I do not care for his appearance, his voice, his manner to his subordinates, his view of his work, his religious opinions, and indeed anything about him that I can think of in which I happen to differ from him. None of these things are in any sense the true reason of my dislike. I disliked him first, and thought of these things afterwards to bolster up an unsatisfactory explanation.

Is any parallel to the strange and outrageous conduct of our patients to be found in life outside mental hospitals? Yes, there are at least two kinds of behaviour which are in their way every bit as strange and opposed to our ideas of what is right and proper. The first, of course, is the behaviour of very

young children, and the second is the behaviour which we exhibit, and observe in others, in our dreams.

Now the great difference between the infant and the insane patient is, that these symptoms in the child are very temporary and transient and can readily be removed, and the means by which they are removed is the process of education and training. We have seen that education and training involve a great deal of repression of unwanted material into the unconscious mind.

But the unconscious mind is no mere storehouse or lumber room; its contents, in proportion to the amount of emotion with which they are charged, are constantly endeavouring to come back into consciousness. Repression prevents them from coming back into consciousness, and a constant struggle goes on between the repressed material and the repressing force. The various efforts made by the repressed material to circumvent repression and return to the surface, and the various means which the individual adopts to maintain and strengthen his repressive power, often produce and explain a very large number of nervous and mental symptoms.

We can now proceed to consider symptoms which are produced by the latter of the two groups named—namely, the efforts of the individual to maintain and strengthen repression.

The nurse will remember that we are discussing one of the most difficult subjects in mental medicine and that it is impossible to enter thoroughly and deeply into the matter, but that there is a very reasonable foundation for the outline which is attempted here.

One of the commonest aids to repression is the process known as **phantasy** or **day-dreaming.** The patient, for example, is unable or unwilling to face the sad truth that some ambition can never be fulfilled, that he is a comparatively poor man instead of being, as he once was, a wealthy one and so on, and he avoids these painful ideas by a process of repression. To maintain and strengthen this process, he steps into a dream-world where everything goes right and nothing goes wrong, and the danger of this lies in the fact that he may become unable to leave his dream-world, which becomes more real to him than the reality he has avoided.

Day-dreams do not hurt the ordinary person because the ordinary person remains very conscious of the difference between his castles in the air and the hard facts of life, and when his work

has to be done he leaves his imaginings and gets to facts; but take, for example, the case of a certain patient of a type which is very common in most mental hospitals.

The patient was a lady of a wealthy and aristocratic family, who had the misfortune to lose all her money and position and was, in addition, thrown over by her lover. She was not left penniless, and by exercising very strict economy she could have lived comfortably enough in a quiet way. But the bitter change from her old circumstances of luxury was too much for her to face, and she is now in an institution with symptoms typical of a chronic delusional insanity. She is a queen and is betrothed to a prince of untold wealth and power, whom nobody ever sees, but with whom she will shortly rule this and every other country, although at present political intrigue is keeping them apart. She is, in fact, living in a day-dream, which has become more real to her than reality itself. She has all her position and power restored to her tenfold. Instead of being the head of a county, she is the head of an empire with nations instead of villagers to do her homage. Instead of being a disappointed, jilted woman, she is now the heroine of a love affair, which is the grandest and most successful that it is possible to conceive.

Cases with grandiose delusions of this sort are common in all mental hospitals and among persons drawn from all classes, and though it is not so easy in many cases to trace the growth of the delusions as in the example quoted above, it can be assumed that their mechanisms are similar—that is to say, they resort to phantasy to avoid reality.

We see, therefore, that delusional states may be produced as the result of unbridled phantasy in persons who use this means of aiding the repression of unpalatable facts, and use it to such an extent as to lose their hold upon reality altogether.

Another way in which repression is aided is by the forced assumption of feelings the very opposite to those which the patient is concealing from himself and from others. Thus, in everyday life we all know the intensely shy person who conceals his shyness by assuming a boisterous good-fellowship and talking, as we say, nineteen to the dozen. The excessive primness and prudery, which are proverbially ascribed to old maids, is another instance of the same thing. The lady represses and ignores the painful fact that her chances of marriage have passed, instead of recognising this and "growing old gracefully." To aid her

repression she will not even admit to herself that she possesses the ordinary desires and instincts of her sex, but goes to the other extreme and assumes an attitude in which she condemns every manifestation in others of these natural feelings, and declares that she herself has nothing but repugnance and contempt for the whole matter, and has, for that reason, taken care to remain single! In a similar way repression is aided by humour or by cynicism. The person who turns everything into a joke or who scoffs at everything as being worthless and unreal, very often does so, although he does not realise it, merely to assist himself in repressing from his conscious mind some painful or tragic incident in his life. Many patients take to drink or drugs for precisely the same reason, and many a drunkard has flown to alcohol merely to help him to maintain the repression of a reality which he was unable to face. Now while it is not suggested that these devices by which repression is aided and maintained are always the cause of insane behaviour, yet instances of their working are to be seen among our patients every day, and they throw a flood of light upon many of the speeches, acts, and mannerisms which we see in the wards.

Perhaps even more important, however, in the production of symptoms are the means by which repressed material in a patient's mind may avoid his efforts at repression and arise in his consciousness in a distorted, disguised, and unrecognisable form. This may best be understood by considering dreams, in which repressed ideas enter the conscious mind in this manner during sleep.

Now in a precisely similar manner a great number of strange, unreasonable, impulsive actions, such as those seen in hysterical and insane patients, are really the disguised and symbolic expression of repressed and buried ideas of which the patient is quite unconscious. Once this is grasped it sheds a great deal of light upon much of the behaviour of our patients which was previously inexplicable. For instance, a patient who washes his hands fifty times a day may be doing it as a means of expressing some painful idea, probably of uncleanness or unworthiness, of which he is now utterly unconscious, but which has chosen this method to express itself. The stereotyped attitude and movements of a certain patient were noticed to resemble those of a shoemaker bending over his work, and it was found that long ago a very painful episode had taken place in connection with such a person. Instances of this kind might be multiplied indefinitely,

and they all go to show that, when the mind seeks to gain relief from a painful situation by not facing it and by forgetting it, the memory persists and strives to express itself in some altered and distorted form in the conscious life of the patient.

Various obsessions, compulsions, and phobias are to be explained in a very similar way. When an intolerable idea is repressed from the conscious mind, the emotion which belongs to that idea cannot remain repressed along with it, but is present in the patient's conscious mind, and in abnormal conditions this detached emotion, as it were, may become attached to some other object present to his consciousness, with which it really has nothing to do. Instances of this are very common in everyday life. Most of us, for example, are familiar with the story of the traveller who, having missed his train through his own carelessness, turned and vented his rage, as we call it, by kicking a harmless porter who was standing by. In just the same way our patients who are in a state of terrible anxiety over trifles, who are frightened of open spaces, who are irritable about nothing, should be regarded as suffering from emotion in the wrong place—emotion which belongs properly to some painful, irritating, intolerable idea. They have succeeded in banishing the idea from their minds, but have had to pay the price by the emotion remaining in consciousness and attaching itself to ideas with which it has nothing to do. Finally, instead of attaching itself to ideas, as has just been described, the unfixed emotion, as it is called, may manifest itself as an actual bodily symptom, such as the loss of power or feeling in a limb, a contracture, a spasm of the muscles, etc. This morbid mental process is called **conversion,** and it is believed that the bodily symptoms seen in hysteria arise in this way.

Mention should also be made of what is really a kind of compromise between the repressing force and the repressed material —namely, a process known as projection. In **projection** the patient does not altogether avoid the painful reality, but passes it on, so to speak, to somebody else. He admits that the painful facts exist, but does not admit that they belong to him. To take examples from everyday life, we know that it is the cunning and deceitful man who is suspicious of those faults in others, and that it is the very stupid man who, rather than admit his own stupidity, blames others for being stupid and confused. The person who feels a secret suspicion that he is not quite of the same

social standing as those with whom he has to do, is very apt to refuse to admit this to himself and to **project** it on to others, with the result that it is just such a person who is apt to describe others as being "bounders," "outsiders," and so on. This mechanism is seen perfectly in the quite common type of case where the elderly lady complains of the attempts of various blameless men to make love to her, abduct her, and so forth. She has refused to admit to herself her normal sex desires and instincts, and rather than do so she projects them on to those around her. Alcoholic patients show this kind of behaviour very frequently, and may often be heard to blame their wives for the unhappiness of their homes, for which they alone are responsible. This method gives the additional advantage of allowing one to condemn one's own faults, but in other people.

To go a stage further, even the voices of conscience may be projected, and seem to come from without, this being a way in which auditory hallucinations arise. The patient has **dissociated,** as it were, a part of his own mind, has split it off from himself, and has taken up the attitude that he has nothing to do with it. His thoughts and ideas therefore seem to come from outside himself, and the reproaches which he would shower upon himself, were his mind one harmonious whole which was fairly facing the situation, come from the dissociated and split-off portion and are thus interpreted as reproaches from outside persons. This dissociation results in the building up of many delusions.

It must be repeated in conclusion that repression plays a large part in the normal life of everyone of us, and is by no means necessarily followed by symptoms of the kind that have been described. It is only when repression is pushed to too great lengths—that is, when things are avoided which ought to be faced —that such symptoms are likely to arise in persons whose general health has been impaired or who are otherwise predisposed.

As was pointed out earlier, repression is often necessary. It is, for example, right and fitting that many ideas and tendencies relating to sex should be repressed. But the energy and emotion associated with these may be dealt with by a process known as **sublimation.** In other words, in the normal person, the feelings and impulses to which certain channels are denied may find a suitable outlet in work, literature, athletics, social gatherings, dancing, or some other healthy activity.

Any direct expression of a repressed instinct which, while serving as an outlet for it, keeps it in useful and healthy channels, is known as a sublimation.

The reader will now understand why arguing with patients is such a hopeless proceeding, and why it is useless to inquire from them the reasons for their abnormal actions. These actions are the expressions of thoughts of which the patients themselves are completely unaware, and their only possible course, when asked to explain them, is to give a series of excuses which we have learned to call rationalisations. This is well seen in the case of the melancholic patient, who states that his depression and suicidal tendencies are caused by his sins. The real state of matters is that the depression came first, and that in the effort to explain it the patient invented the rationalisations that he had committed various sins and crimes. Many delusions arise in this way, and are simply rationalisations to which the patient clings in the constant attempt to find some reasonable explanation of his mental discomfort.

Now, from all that has been said, it will be clear that the object of treatment from this point of view should be to unearth and bring up to the patient's conscious mind the forgotten and repressed reality which he is avoiding. When this is done there will be no longer any need for repression, and the symptoms will disappear exactly in proportion as the patient faces and adjusts himself to his various problems and difficulties. This is the principle of treatment by **psycho-analysis,** and it has been applied with very striking success in a large number of mild and borderland cases. Unfortunately, however, in the case of the majority of patients in the mental hospital, although the mental workings seem to follow the same rules, yet the response to such treatment is so far sadly different.

In any case, the treatment is one of very great difficulty, and one which makes immense demands upon the time, skill, and character of the person undertaking it; and clumsy attempts at psycho-analysis do more harm than good. On the other hand, while it is generally impossible for the nurse to do very much towards leading back to the original repressed ideas in any well-established case, and questioning is in every case to be avoided, kindly and sympathetic conversation about his troubles with the patient can hardly do harm, and may do great good. Apart from this, splendid work may be done in directing and

assisting sublimation on the part of the patient—that is to say, by endeavouring to see that out of the various indirect expressions which are open to his repressed ideas, he chooses activities which are harmless and even useful, instead of useless and degrading. Care and understanding interest bestowed upon a patient who, for example, writes interminable, vague, and rambling letters may result in his being brought to write essays and articles of interest and use. Aimless violence may be transformed into useful handiwork, and a habit of fussy interference into general helpfulness. There is no department of mental nursing so difficult, so interesting, or so worth while as that of developing a patient's character by awakening new interests and directing his energies in the process of re-education.

SECTION IX

CAUSES OF NERVOUS AND MENTAL DISEASE

A KNOWLEDGE of the cause of a disease is of great practical importance. If the cause is one that we can remove, we shall be able to prevent further cases from occurring. If it is one which continues to act after the commencement of the illness, we shall be able to check the further development of the disease. For instance, in a case of lead paralysis the recognition that it is due to working in lead will cause us at once to recommend a change in the patient's occupation, without which the disease would inevitably become worse, whatever the treatment one might adopt.

The history of medicine shows us that in the early stages of the knowledge of any disease, numerous causes are looked upon as responsible, some in one case, some in another. As more becomes known, the number of causes is gradually reduced, and in those diseases of which our knowledge is extensive, there may be only one that is looked upon as essential. Without it the disease cannot occur, though other causes may be guilty of aiding and abetting. Our knowledge of the causes of insanity is far too incomplete for us to reach this ideal, except in very few cases; the most striking example being general paralysis of the insane, known to be invariably due to syphilis.

There are few things which have not at one time or another been regarded as causes of insanity: the moon, planets, witchcraft, and the "evil eye" having been particularly popular with the writers of earlier days. Though these theories are now discarded, many others have taken their place, and it is necessary to have some definite arrangement to enable us to obtain a clear understanding of them.

HEREDITY.

Heredity means the transmission of qualities from the parents or ancestors to their offspring. The first point to note is that mental disease may arise from some weakness in the two original

cells from which the body develops: the ovum, derived from the mother, and the spermatozoon, derived from the father. Each of these cells, though so minute, is a summary of the mental and physical attributes, good and bad, of all the ancestors for many generations. When the ovum is fertilised by the spermatozoon, the attributes of the two parental families are mingled, not necessarily equally, to form a new blend. It is as if our houses were never built of new bricks, but always of those taken from two other houses. Note, that although the bricks from the two old houses may be mingled in the new one in inextricable confusion, yet each individual brick will retain its individuality. It must have come from one only of the original houses. In the same way, it is considered that the innumerable characters, mental and physical, of which we consist, are all separate and indivisible, and each is derived from one of our parents, not from both. The elements are known as **unit characters.** The colour of the iris is thought to be such a unit character. It can readily be imagined that in the course of time, as houses were pulled down and built up again, bricks derived from some of the ancestral houses would prove of better quality and more lasting than those from others. So, certain of our unit characters tend to last better than others, and become obvious, generation after generation. But it is well known that sometimes a character which existed in one ancestor may remain dormant or inactive for one or more generations, and then make its appearance again. This, in popular language, is known as a "throwback," and scientifically as an **atavism.**

The above laws of heredity have in great part been established by the work of a Moravian priest named Mendel, and their study is known as **Mendelism.**

If we apply them to mental disease we find first that in very many cases some of the patient's ancestors have been insane, or betrayed some other form of mental instability, such as epilepsy, crime, alcoholism, or merely eccentricity or undue nervousness. Some forms of mental disease are, therefore, said to be **hereditary.**

But attention must be drawn here to a matter of great importance.

Usually all that is inherited is a weakness or **predisposition** towards mental disease, not the disease itself. The person concerned may be apparently normal for many years, and

then break down, perhaps from comparatively slight causes, insufficient to cause a breakdown in a person of sound ancestry.

As a faulty bridge may last for years with ordinary traffic, and then break under the load of a traction engine, so a person with a predisposition to mental disease may remain healthy until the load becomes too great to bear. Such a person may never break down at all, if the stresses of life never reach his breaking-point. On the other hand, there are probably no individuals who are so stable as to be entirely immune. If the strain were sufficiently severe we should all break down.

In another group of hereditary cases the mental weakness is apparent from birth, and presumably the brain was defective before birth. Many idiots, imbeciles, and feeble-minded belong to this group.

We have therefore the two groups of hereditary mental disease—the one in which the disease is present from birth, and the other in which it is only a predisposition, requiring something further to convert it into an actual attack.

It is not uncommon to find instances of atavism in mental disease. As explained before, this means that the disease reappears after missing one or two generations.

Where there is much insanity in a family it is found that the disease tends to commence at an earlier age in the younger generation. It has been pointed out that the type of disease tends to become worse. For example, a man who has an attack of mania in adult life may have children who develop dementia præcox in adolescence, and their children in turn, if they have any, would probably be imbeciles.

The marriage of cousins and other nearly related persons is regarded as liable to lead to the occurrence of mental disease in their children. It is obvious that the more closely people are related, the more likely they are to resemble each other, both in the strong and weak points of their character. If, then, there is any tendency towards mental instability in the family, there will be, as one may say, a double dose of it in the children. In marriage between unrelated persons there is a greater chance that the strong unit characters of the one will neutralise the weak characters of the other.

We may now pass to the consideration of those causes acting after conception—those which affect the patient's "nurture," as

distinct from the influence of heredity which affects the patient's "nature."

All such causes, and they are numerous, may be divided into two groups. The first, called **physiogenic,** includes those which arise from bodily changes of a pathological kind, including disease processes, which act upon and alter the delicate mechanism of nerve cells and fibres constituting the nervous system. The result is derangement of the highest function of the system—namely, mind.

The second group of causes is called **psychogenic,** and includes those which arise from the operations of the mind of the patient. The relative importance of these two groups is the most controversial topic of mental science to-day. The nurse must not regard them as being very clearly defined and distinct. In many patients causes from both groups are present, and act and react one upon the other. We are all well aware how clearly mind and body are linked together. For example, think of the failure of appetite and sleep most persons experience during a period of domestic or financial anxiety, and compare that with the hunger and pleasant outlook on life induced by an afternoon's exercise in the open air.

Causes from one or other of these groups may have little or no power in themselves to produce an attack of mental disease, but may act by paving the way to a breakdown. Such causes are known as **predisposing** causes. A predisposing cause renders the mind less able to resist the influence of a more potent cause. The factor actually producing an attack of serious mental illness is called the **exciting** cause. It may be compared to the last straw that breaks the camel's back. Remember that a cause may be a predisposing cause for one patient and an exciting cause for another.

We shall now consider physiogenic and psychogenic causes in some detail, although quite briefly, and once again the nurse is warned not to think of the two groups as acting entirely distinctly one from the other.

PHYSIOGENIC CAUSES.

Under this heading are included all those factors which operate after conception, with the exception of those arising in the mind itself. These causes are essentially due to conditions of the body, including changes in the delicate nervous system itself.

Nervous diseases, such as paralysis agitans and disseminated sclerosis, are also due to disease processes in the central nervous system, not necessarily associated with disorder of conduct or insane beliefs. We are here chiefly concerned with disordered minds. A great many of our hospital cases come under this heading—for example, the general paralytic, where the very marked deterioration of mind and character is due to the influence of the poison of syphilis on the nervous system. Again, the lost and demented senile cases are the result of widespread degenerative changes in the body, including the brain.

Very acute excitement may be the result of the poisons of alcohol, puerperal fever, typhoid fever, or influenza.

For the sake of clearness, physiogenic causes may be divided into various classes:

I. **Influence of Age.**—There are certain periods in life at which there is a greater liability than at others to mental breakdown. These are puberty and adolescence, the climacteric and senility.

Puberty is the age at which the sexual functions become active, and **adolescence** is the period from puberty until maturity. Legally it ends at the twenty-first birthday. During this period there is an immense change in the mental outlook and habits. The characteristic disorder of this period is dementia præcox.

The **climacteric** is the period at which the sexual powers wane and disappear. Best defined in women, it is also present in men, and in both sexes there is a marked tendency to mental instability, of which melancholia is the most characteristic outcome. In this connection the term involutional melancholia is sometimes employed.

Senility may be taken for practical purposes to commence at seventy, though there are great individual differences. Here the changes are those of the natural degeneration common to all mankind, but which in certain people affects the brain to a greater degree than the other organs. Senile dementia is the form of mental disease peculiar to this period.

It will be seen that when one speaks of age as a cause of insanity, one refers chiefly to bodily changes which take place at certain ages.

II. **Sex.**—Insanity is rather more common in men than in women, with the exception of married women of the child-bearing age, for they have a larger proportion of insanity than married men of the same age. Pregnancy, childbirth, and

lactation are stresses peculiar to women, and not infrequently a causative factor in mental illness. This is due, in many cases, to poisons from bacterial infection or auto-intoxication (see below).

Illegitimate pregnancy is more likely to cause mental illness than pregnancy in married women. Here the cause is often psychic rather than physical, and is due to the effects of shame and fear.

III. **Marriage.**—The percentage of the population becoming insane is about twice as great in the single as in the married, and the widowed hold an intermediate place. This marked difference is partly due to the stabilising influences of marriage, but there are other reasons for the difference. Defective, degenerate individuals, and those with sexual complexes and perversions, are less likely to marry than those of a sound mental constitution, and are much more likely to become insane.

IV. **Injury** to the brain from concussion or laceration may produce profound mental changes, generally of the nature of dementia. Epilepsy, and particularly the form known as Jacksonian epilepsy, is a common sequel. But extensive loss of brain substance may occur without marked mental changes. Some form of paralysis is usually present.

Similar effects arise from injury to the brain by cerebral hæmorrhage, thrombosis, or embolism, the usual result being again a form of dementia with paralysis.

V. **Arterio-Sclerosis.**—A chronic disease of the bloodvessels which plays a most important part in the causation of the insanities of later adult life and senility, especially when the cerebral vessels are much affected.

VI. **Toxic Causes.**—Under this head one includes all harmful agents of the nature of poisons, whatever may be their origin. They may be divided into:

(*a*) Poisons taken voluntarily or involuntarily;
(*b*) Micro-organisms and the diseases produced by them;
(*c*) Auto-intoxication.

(*a*) **Poisons.**—The most important of these from our point of view is alcohol.

It must be noted that although alcoholism is often a symptom of a previously existing change, yet it does produce several very well-marked forms of insanity. These are due

entirely to the effects of the alcohol, and not to the underlying mental weakness.

Drugs such as opium and its constituent morphine, cocaine, and other habit-producing drugs, cause mental disorders and occasionally insanity.

Lead poisoning acts chiefly by producing arterio-sclerosis with consequent cerebral degeneration. Arsenic may also produce mental symptoms, usually of confusion, and resembling those of one form of alcoholic poisoning.

(*b*) **Micro-organisms,** and the diseases produced by them. Syphilis is the most important of these, and is fully dealt with elsewhere.

The toxins of some of the fevers—such as typhoid, influenza, and scarlet fever, and particularly the septic infection of the uterus after childbirth, known as puerperal septicæmia—may all produce insanity.

The form of the mental disorder is usually that of confusional insanity or acute delirious mania, and it is becoming more and more evident that even in the case of puerperal mania there is some toxin at work. This toxin may be produced by bacteria, or it may be the result of the breaking down of some of the protein substances contained in the body fluids.

(*c*) **Auto-Intoxication.**—By this is meant the production of poisonous substances by the body, particularly those which are absorbed from the intestines in chronic constipation and from the gums in pyorrhœa. The influence of these is very widespread, and they undoubtedly play a part in the production of some mental disorders, especially melancholia and confusional insanity.

Uræmia and diabetes may be mentioned here as occasional causes of mental disorders.

Exhaustion from hæmorrhages, starvation, or wasting diseases —such as phthisis and cancer—has been widely held to produce mental disorder by causing anæmia of the brain. It is difficult in any one case to determine how much one should ascribe to this and how much to auto-intoxication.

VII. **Internal Secretions.**—These are the substances which are formed in many of the numerous glands of the body, and are passed by them directly into the blood which circulates through them. Some of the glands also produce secretions which are poured through ducts, generally into the intestinal canal. The latter secretions have no interest for us in this

question of the causation of mental disease, but the internal secretions are of great importance.

The principal ones are those produced by the **thyroid gland, pituitary body, adrenals,** and **parathyroids,** the **testicles** and **ovaries.** Their functions are of the most varied kind, but from our present point of view it must chiefly be noted that they influence the balance of power between the two great divisions of the involuntary nervous system, the autonomic (or vagal) and the sympathetic.

These two divisions have opposite effects on the viscera and the bloodvessels which they control. According to which of them has the greater influence in a particular individual depend to a great extent his temperament, his energy, and his ability for mental work. These effects are due to the larger or smaller amount of internal secretion produced by the glands, chiefly the adrenals and the thyroid, under the influence of the two systems.

In some forms of insanity there is evidence that one or other of these two systems has obtained an undue influence. The condition is then known as **sympathetico-tonus** or **vagotonus,** as the case may be. For instance, in melancholia the sympathetic system has gained the upper hand, and there is said to be sympathetico-tonus.

Besides this effect on temperament and character, the internal secretions control the growth of the body and the sexual glands. The influence of the activity or lack of activity of the sexual glands has an enormous effect on both the mind and character of the individual, and on his growth.

In dementia præcox Sir Frederick Mott has shown that there are regressive changes in the testicles or the ovaries, probably due to an inherent defect in the germ cells at the time of conception, and it has been suggested that the symptoms of that disease are due entirely to the deficiency or alteration in the internal secretions from these glands.

PSYCHOGENIC CAUSES.

It has long been held that emotional disturbances—such as grief, fear, worry, anxiety over financial and business matters, love affairs, and family disagreements—may bring about an attack of insanity. That they may seriously affect the harmonious working of our minds for a time, even rendering us

incapable of carrying on our ordinary daily life satisfactorily, is a matter of common personal experience, and cannot be disputed.

That the disturbance may develop into an attack of mental disease is also unquestionable, but, as we shall see later, there is generally some previous weakness or predisposition.

It must be remembered also that the worry or anxiety which is looked upon as the cause of the disease is frequently merely an early symptom. The irritability and impairment of reasoning power which occur in the early stages of mental disorder may lead to family disagreements and business complications, but these are effects and not causes.

The term "religious mania," which is sometimes used about patients, conveys an erroneous impression, and suggests that religion may be a cause of mental disorder, which is not the case. Delusions of a religious character are very common in our hospital wards, but they are the expression of an attempt on the part of the patient to account for his feelings and ideas, and explain his depressing beliefs and disordered conduct. The process is termed "rationalisation." It is present in normal persons, and is explained elsewhere.

Of late years a great deal has been done by Professor Freud of Vienna to throw light on the mechanism of the psychogenic causes of mental disorders, and he claims to be able in some cases to trace the various steps by which a given cause gives rise to the symptoms of mental disease.

The nurse is advised to revise the section on the psychological aspect of mental symptoms at this point. Here we shall briefly recapitulate the mechanism of psychogenic causes in mental disorder, and give a few examples as illustrations.

There are present in all of us, from infancy onwards, wishes and strivings of an instinctive kind. Many of these tendencies have to be restrained and controlled by moral codes, laws, and social conventions. For example, the sight of a fine diamond necklace may arouse an impulse to possess it, accompanied by a feeling of envy. Social law and custom successfully inhibit the impulse in most people. Again, the soldier may feel the instinctive wish to fly from danger, but military discipline, patriotism, and duty urge him, generally successfully, to ignore the danger and press forward in spite of its presence. Wherever there is opposition between primitive, instinctive wishes and tendencies and forces of a social kind preventing their gratification, a

conflict is said to be present. Briefly, the conflict is nearly always between pleasure impulses and social impulses. In highly civilised communities the instinct with which our social impulses are most in conflict is the sexual instinct. The term " sexual " is here used in a very wide sense, and not in the limited physical sense in which it is generally understood.

Conflicts must somehow be dealt with and resolved. A constant state of mental tension and irresolution is impossible to the individual. How, then, may conflicts be resolved ? The ideal method is by a logical and fully conscious choice on the part of the individual, and a conscious selection of the line of conduct to be followed. This may be termed **conscious control.** Were this method always possible, and always adopted, a great step would be taken towards the prevention of nervous and mental disease. In many individuals conscious resolution of conflict does not take place. The wish impossible of gratification is then banished from consciousness and, becoming unconscious, forms part of the unconscious mind. The conflict is forgotten and remains unconscious. It cannot be recalled by any effort of will, but it remains nevertheless to influence conscious thought and action. Such a wish, now unconscious, is termed a **complex,** and the process by which it is removed from consciousness is termed **repression.** Forgotten wishes and tendencies thus repressed are kept out of consciousness by a resistance or barrier, which we term the **censor.**

It has been stated that complexes, although unconscious, will still influence conscious thought and action. We must now consider a few ways in which the barrier or censor is evaded, and repressed material becomes able to manifest itself in consciousness. Much work has been, and is still being, carried out, in investigating the causative influence of repressed complexes in mental disorder. Three classes of disorder result from the activity of repressed complexes: the **psychoneuroses,** the **neuroses,** and the **psychoses.**

The mental nurse will be most familiar with cases of the last class, and will not often meet those belonging to the first two classes. No classification or detailed description of these disorders will be attempted in this section, but we shall see how these unconscious mechanisms influence consciousness in certain defined ways, and give illustrations from different types of mental disease.

Before entering into detail, it must again be impressed upon the nurse that *a complex is unconscious, as in repression.* The conflict between unconscious motives and the censure is only expressed indirectly in conscious thought and behaviour. Further, a complex may be compared to a malignant growth. It grows at the expense of the normal mind, and invades and distorts the proper conscious adjustment of the individual to the world of reality. This shows the importance of early treatment. A patient who is seen late in the course of a psychosis—such as paranoia—has little normal mind left. His complexes have grown and developed, so that readjustment is indeed a formidable task, and has generally become impossible.

We may now pass to the consideration of the later history of a complex and methods of dealing with repressed material.

Sublimation.—This is a condition in which the energy and interest attached to the repressed wish are transferred to some object or pursuit which is not in conflict with the censure. Art, music, and hobbies are common sublimations. The middle-aged spinster, exceedingly prudish about sexual matters, may devote the energy normally expressed in marriage and the upbringing of children to the care of cats and dogs. Sublimation must not be regarded as abnormal. It plays an important part in normal everyday life and is of enormous social value. The process can be employed in mental hospitals by encouraging all sorts of varied occupations for the patients.

Dissociation.—This is an interesting result of conflict. It may be seen in many patients in a mental hospital, and frequently also in normal life. The complex here evades the censure entirely, and exists sometimes side by side with normal life, or sometimes replaces it entirely. The process explains how, in some individuals, shady business methods can be used from Monday to Saturday, while Sunday is spent in strict religious observances. Every mental hospital knows the grandiose patient who believes herself to be of royal descent, but nevertheless works cheerfully at menial tasks in the ward. There is a splitting of consciousness in these examples, and no intermingling of the two streams. In more extreme cases repressed wishes and memories may take the place of the normal mind for a time and reign alone, and there will be a complete loss of memory for what happens in each state of consciousness. These states of consciousness may alternate fairly constantly,

as in cases of **double personality;** they may make their appearance at irregular intervals, and last for two or three days in **fugues** (or flights), during which the patient wanders or runs away from home; or they may last for a few hours, as in **somnambulism.**

Projection.—Here the mental changes are of a very different character. The wish that is not allowed to enter consciousness is projected upon some other person, and so finds expression, being supposed by the patient to occur in the mind of some real or imaginary individual. Here again projection occurs in normal persons. People commonly show intolerance for those with the same faults as themselves. Unwilling to blame themselves, they blame persons with similar failings. Projection is well seen in cases of paranoia where a projected idea reappears in the mind of the patient as a delusion of suspicion or persecution, which by more or less logical reasoning is developed into a complicated delusional system.

Regression.—Where there is considerable replacement of the normal mental content by dissociated ideas, the patient gradually comes to neglect the realities of his environment, and retires into a little world of his own in which he can indulge his repressed wishes, in fancy or phantasy, without disturbance by the greater world around him. As there are resemblances in his mental state to the stages through which a child passes in the development of the mind and character, we speak of his condition as one of **regression to a lower level.** Regression is well illustrated in many cases of dementia præcox.

The nurse should now have some idea of the great importance of mental conflict in the causation of mental disorders. Some authorities hold that the factors causing the majority of psychogenic disturbances are connected with the instinct of sex. This view is supported by a great and increasing amount of evidence. Analysis and investigation show that most complexes arise in early life, and are due to infantile repressions which have not permitted a proper adaptation to environment in adult life.

The reader must understand that this short survey of psychogenic causes in mental illness is not written in any detail, and many conditions and mechanisms are omitted. Enough has been said to give a nurse some slight knowledge of psychogenic causes, and a clearer insight into the origins of many cases of illness encountered in the wards.

SECTION X

SIGNS AND SYMPTOMS OF NERVOUS AND MENTAL DISORDERS

In speaking of the nervous system we commonly regard its functions as twofold: nervous, concerned with the control of the muscles and organs of the body, and mental, concerned with the processes of the mind; but it is not possible to regard these as altogether separate from one another.

It is the object of this section of the book to deal with the various abnormalities, both of nervous and mental functions—that is to say, the signs and symptoms of nervous and mental disorder.

Pain is a common symptom of most illnesses, and yet its nature is still little understood. It is believed that strong irritation of most sensory end-organs will cause it, and so it is seen in inflammatory diseases, where the tissues swell and cause compression of the nerve endings. There is good ground for supposing that the centre for pain is in the thalamus. Certainly the brain cortex has no sensation and cannot feel pain, although consciousness is necessary for its appreciation.

If a nerve is recovering from injury, there is a stage where the protopathic functions (that is, the appreciation of pain and temperature without localisation) recover long before the epicritic functions (that is, the finer appreciation and localisation of degrees of touch, pain, and temperature), and in these conditions stimuli may cause a pain which is severe, widespread, and poorly localised.

Internal organs are not very sensitive, some say not at all.

Pain associated with derangements of the internal organs is appreciated by the voluntary fibres which belong to the same spinal root as the involuntary fibres going to the affected organ, and the pain is thus " referred," as it is called, to the part of the body supplied by these voluntary fibres.

DISORDERS OF SENSATION.

Feeling or sensation in any part of the body may be impaired or completely lost from various physical causes, such as injury to the sensory nerves concerned in some part of their course; injury to the brain or spinal cord; the action of intense cold, drugs, or poisons; or from purely mental causes, as in the disease called hysteria. Sensory loss is called **anæsthesia.** A drug which will produce loss of sensation in any part of the body is known as a **local anæsthetic,** while drugs—such as chloroform—which temporarily suspend both sensation and consciousness, are called **general anæsthetics.**

Excessively acute sensation is found as the result of inflammation or irritation of the nerves or from mental causes. It is called **hyperæsthesia.**

Anæsthesia may occur from disorders of the higher mental functions, as in advanced states of dementia, stupor or hysteria. If it is complete and universal, it is practically always hysterical. In some cases exactly half the body is affected, a state called **hemianæsthesia,** which may be either hysterical or organic. In disease of the postcentral convolutions the protopathic sensations are not as a rule involved, but the epicritic, which demand judgment and mental activity, are affected. Thus we find untrustworthiness in the answers and early fatigue, so that in repeating a test the patient soon ceases to feel such a light stimulus as a touch. Also, he cannot recognise differences in weight or tell the position of his limbs with his eyes shut, because his deep system of muscle and joint nerves is impaired. He can still feel pain, heat, and cold.

The central end-station of the sensory nerves is in the thalamus, so that in disease of that part of the brain disturbances of sensation are always found. The whole of the opposite side of the body is affected, and all sensation or any form of it may be perverted. There may be loss of feeling to light touch, combined with severe hyperæsthesia to pain, heat, or cold, and spontaneous pains of great severity may appear.

The sensory paths cross to the other side higher up the brain stem than the voluntary motor paths, so that various combinations of symptoms, too complicated for description here, may arise from disease in the pons or medulla. The most typical are

crossed anæsthesias and **paralyses,** one side of the face and the other side of the body being affected.

In disease of the cord many varieties of sensory loss may appear, generally in combination with motor paralysis, and we may get dissociation of the various forms of sensation owing to the fact of the fibres for pain, heat, cold, muscle and joint sense, and light touch crossing at different levels.

To test sensation we use a wisp of cotton-wool for light touch, a pin for pain, and a test-tube of hot or cold water for temperature. To test joint or muscle sense, we make the patient copy movements, or tell him to execute them with his eyes shut, and we also test his capacity of judging different weights which look the same.

Lastly, sensation may be perverted, that is to say, abnormal, and unusual sensations may be experienced in various parts of the body, such as feelings of heat and cold apparently without sufficient cause, numbness, tingling, and so on. Such a state is called **paræsthesia,** and it will be seen that if a paræsthesia takes the form, for instance, of a gnawing sensation in the abdomen, it may very easily form the starting-point of a delusion.

DISORDERS OF MOVEMENT.

Injury to or disease in the brain, spinal cord, or motor nerves may cause weakness or complete loss of power in any muscle or group of muscles, although these may be perfectly healthy. A hæmorrhage, for example, in a certain part of the brain may cause a complete loss of power in the voluntary muscles of the other side of the body, which is called **hemiplegia.** Other quite common conditions are paralysis of one limb (**monoplegia**) or of both legs (**paraplegia**). The harmonious working together of various groups of muscles, which is essential for the carrying out of complicated actions, such as the preserving of balance, can be very readily upset, usually by disease in the spinal cord, and the state called **incoordination** or **ataxia** results. A diseased condition of the cerebellum—such as the presence of a tumour—causes incoordination of muscles, and hence unsteadiness of balance and gait. This is known as **cerebellar ataxia.**

Disorders of movement are far too complicated for full consideration in a book of the present character, but a few words must be said about them, sufficient to interest the nurse in the

subject and give some idea of how, in general, the loss of power in a patient is brought about.

A sensory or a motor loss may occur in hysteria, and here there is no organic nervous disease, the symptoms being due to mental causes, as explained elsewhere. It may be complete in the limbs, but if so, it rarely affects the face, and sometimes the patient, when unwatched, performs every movement normally. Or it may pick out groups of muscles in face or limbs, but never individual muscles. Lastly, there is practically no atrophy except such as occurs from long disuse.

But if the loss is due to organic disease, we must decide where this is situated. Of course, it is necessary to look for surgical injury, which in an unconscious patient may not be at first apparent. Next we must handle the limbs, holding each joint in turn, and test for flaccidity or resistance. Then the patient is asked to attempt voluntary movements at each joint while the joints above are firmly held. By these means we may decide that a hemiplegia is present. If this is complete, involving face, arm, and leg, it must, if situated in the brain cortex, involve a large area of the precentral convolution on the opposite side, and either sensory loss will also be present, or the special senses will be affected, or Jacksonian fits will occur, or the patient will be comatose. But lower down in the pyramidal tract, where the fibres converge in the internal capsule, a minute injury —such as a thrombosis or embolism—may cause widespread paralysis, especially in the opposite leg and arm, without any of these complications. After the hemiplegia has lasted for some time there will be spasticity (rigidity) as well.

If a paraplegia is present we first seek for its cause in the cord, where both pyramidal tracts are close together. If we find sensory loss and spasticity, our suspicions are strengthened. Injury, myelitis (inflammation of cord), hæmorrhage, or tumours of the spinal canal, are the commonest causes. All sorts of complications may occur in diseases of the cord—dissociation of heat, cold, and pain from touch and localisation, or loss of sensation on one side of the body, with paralysis on the other. Disease of the vertebral bones may also be a cause of paraplegia.

If a monoplegia is found, we first suspect injury or disease in a peripheral nerve, especially if anæsthesia is present. Of course, there are many exceptions to such generalisations. In many cord diseases, where the large motor neurons in the anterior

horn are affected, atrophy of individual muscles, or of widely separated groups of muscles, may occur, a condition not seen in brain disease.

Lastly, paralysis may be caused by disease of the nerve endings in the muscle fibres, as in polyneuritis, or of the muscles themselves.

The nurse is sometimes called upon to prepare the apparatus for testing paralysed muscles by electricity, and must therefore understand the nature of the test. The current is passed from the main into the apparatus, which is so constructed that it supplies either a "faradic" current (which constantly changes in direction, and keeps a muscle in a state of tonic contraction, but is rather painful) or a "galvanic" current, which flows evenly in one direction until its direction is changed by the commutator key, and which produces a contraction in muscles only when the electric circuit is opened and closed. The attachment screws on the apparatus are marked + (anode or positive pole), and – (kathode or negative pole). The patient's back is scrubbed with soap and water to remove grease, which acts as a non-conductor, from the surface of the skin, and the large metal pad covered with wash-leather, is soaked for a few minutes in salt and water, and is bandaged on. This pad is then attached by one flexible wire to the positive pole. The small button terminal, likewise soaked in salt water, is attached to the negative pole, and the muscle to be tested is touched with this. With a very weak current nothing occurs, but as the strength is gradually increased a time comes when the muscle, if it be healthy, twitches when the button pad is placed on it, but not when it is lifted off. The current is now reversed by the commutator, and no twitch should occur either when the button is lifted from the muscle or placed on it; but if a twitch does occur when the pad is placed on the muscle, what is called the **reaction of degeneration,** or popularly R.D., is present.

In health the reaction is represented by KCC>ACC (kathodal closure contraction greater than anodal closure contraction), but in R.D. by ACC>KCC. The reaction of degeneration occurs when the muscle fibres are cut off from the nutritional stimulus normally reaching them from the ventral horn cells of the cord. With a faradic current a muscle which shows R.D.will not contract at all with any strength of current which can be borne. After the test the pads must be rinsed in tap-water and hung up to

dry. They must not be placed in the box, or they will corrode the wires. All screws and terminals must be carefully dried to prevent rusting.

Tremor is another frequent disturbance of motor function, and is a symptom of a great many nervous disorders. Tremor is a rhythmical movement of groups of muscles or of the whole body, and is always associated with a lack of normal balance between the voluntary (pyramidal) and the automatic (rubro-spinal) motor mechanisms. It is seen in emotion, exophthalmic goitre, neurasthenia, paralysis agitans, senility, and as a sequel of encephalitis lethargica and toxic states like alcoholism; the exact mechanism of its production is not fully understood, but it is not uncommon in disease of the striate body, and is often accompanied by rigidity. In a case where tremor is present, the nurse should try to find out whether it is increased when the patient tries to do something requiring careful coordination of muscles (intention tremor), such as threading a needle, or if it ceases when such an attempt is made. This point is of considerable importance in distinguishing the "intention tremor" of some nerve diseases from the tremors of others which do not prevent the patient, when he tries, from holding a full cup steadily, though his hand shakes constantly when not in use.

Then there are irregular involuntary movements, the most important of which are **chorea,** where the movements vary from jerks of the fingers or head to tumultuous and uncontrolled contortions involving the whole body; and **athetosis,** the slow, curling or worm-like movements of an arm or leg long partially paralysed; athetosis is very common in the cases of congenital spastic contracture in imbeciles.

Among other common forms of involuntary movement we may mention **shivering,** or **rigor,** an attempt to produce heat by muscular contractions as a reflex response to coldness of the skin; **flickering,** small tremors seen or, rather, felt in isolated muscle bundles, often as a result of fatigue or ill-health; and **fibrillary twitching,** seen well in general paralysis, especially at the beginning of a voluntary movement.

The muscles may be thrown into a state of sudden and sustained contraction—**tonic spasm;** or into a series of rapidly repeated contractions of a convulsive nature—**clonic spasm**—as in epilepsy; or they may pass into and remain for long periods in a state of rigid contracture—**spastic paralysis.** They may also waste or

atrophy, either from disuse following a paralysis or in a still more gradual manner without sudden loss of motor power.

Mention must be made of habit spasms, organised jerks of groups of muscles, such as the tricks of movement seen in public speakers, or blinking (blepharospasm), or jerking the head to the side. When violent, these movements are called **tics,** and are often associated with slight degrees of mental disturbance. Their nature points to their being closely allied to stammering, swearing, echolalia, obsessions, and phobias. **Reflex spasms,** as in anal spasm or tic douloureux, often accompany painful sensory stimulation. **Hysterical spasms** are also not uncommon.

There is also a rare condition in which the muscles appear to grow abnormally large in certain parts of the body, though the apparent overgrowth is accompanied by great and progressive weakness (pseudo-hypertrophic paralysis). Here fibrous tissue gradually replaces the muscle fibres.

Convulsions.—A convulsion is defined as " a sudden tumultuous discharge of motor energy." For the present we need only note that convulsions are characterised by violent and uncontrollable muscular contractions, spasms, rigidity, and sometimes tremor. The participation of the muscular wall of the bladder in these violent contractions frequently causes urine to be passed during a convulsion; and the violent contractions of the jaw muscles often cause the tongue to be bitten.

REFLEXES.

In Section VII. (p. 323) the reader has already studied what is meant by **reflex action,** the physiological process by which sensory stimuli are converted into movement without the intervention of the will, for example, movement of the lower limbs when the soles of the feet are tickled. In certain forms of nervous diseases these reflex responses are altered in character according to the part of the reflex arc involved. They may become exaggerated or decrease or disappear completely. The superficial or skin reflexes may no longer be elicited by stimulation, and by noting the portion of skin thus affected it may be possible to discover the area of disease in the spinal cord. The deep reflexes, such as the knee-jerks, may be lost in certain diseases such as locomotor ataxia and some types of general paralysis, and in some forms of alcoholism. There may be abnormalities in the reactions of the pupil of the eye.

Broadly speaking there are many classes of complicated mental processes and automatic actions which are reflexes, such as saying "good-morning," or "fine day," knitting, walking, or, in the case of an accomplished performer, playing the piano. Most of these are examples of "conditioned reflexes," seen in simpler form where sounds or sights usually associated with food cause salivation and gastric secretion, even if no food follows. There are also many reflexes of visceral origin, such as vomiting, micturition, defæcation, and parturition. All habits, and even instinctive actions, are reflexes.

But in ordinary nursing the term is more restricted, and we apply it to the muscular reaction induced by stimulating the skin, the object being to discover where and how far there is derangement of nerve function. Some reflexes are always present in health, and their loss or exaggeration indicates disease; others are present only if nervous excitability is increased. These simple reflexes are divided into two classes—**superficial,** or skin reflexes, and **deep,** or bone-tendon reflexes.

Superficial Reflexes.

Name.	*Method.*	*Result.*	*Level Affected.*
Corneal ..	Touch eyeball	Eye shuts	Cr. 5–Cr. 7
Palatal ..	,, soft palate	Palate and uvula are raised	Cr. 9–Cr. 12
Epigastric	Stroke down chest	Epigastrium dimples	Th7–Th9
Abdominal	,, down abdomen	Abdominal wall contracts	Th11–L1
Cremasteric	,, inner thigh	Testicle is drawn up	L1–L2
Plantar ..	,, sole	Toes are flexed	L5–S2
Anal ..	Prick perineum	Sphincter ani contracts	S4–Co.

Deep Reflexes.

Name.	*Method.*	*Result.*	*Level Affected.*
Pupil ..	Shade and expose to light	Pupils dilate and contract	Cr. 3 and Sympathetic
Wrist ..	Tap upper radius	Wrist and fingers extend	Cer. 6–Cer. 8
Knee ..	,, patellar tendon	Leg kicks	L3–L4
Ankle ..	,, tendo Achillis	Foot extends	S1–S2

The above is a table of those commonly used, together with the regions in brain or cord whose integrity or otherwise they

demonstrate; in each case a single stimulus produces a single movement.

Some remarks must be made upon the method of obtaining such of the above as the nurse will commonly see tested or be required himself to test. The **corneal reflex** disappears when a general anæsthetic has taken effect, and is used as a test by the anæsthetist during surgical operations. It must not be often or carelessly repeated lest subsequent irritation result.

In taking the **pupil reflex** expose and shade each eye in turn, taking care that the amount of light falling on them is equal. Both pupils should react when either is tested. Failure to react may indicate blindness, short sight, or adhesions from inflammation or congenital malformation, as well as nerve disease. The absolute size of a pupil is unimportant; it dilates in many conditions—*e.g.*, ill-health and anæmia—and is often contracted. But it is never " pin point " in a moderate light except in locomotor ataxia, general paralysis, or as the result of some poisons. If the sympathetic nerve in the neck is paralysed the pupil will expand half-way in dim light, but it never becomes large.

The **abdominal reflex** may be increased in hysteria or in locomotor ataxia. It is never wholly lost in health, unless in old or fat people, or on exposure to cold. It may be absent in appendicitis, enteric fever, meningitis, and many diseases of the spinal cord.

In testing the **plantar reflex** the patient's feet must be warm. He lies on a couch with the knees slightly drawn up and the feet everted. The sole is stroked from behind forwards with a light, hard object, such as a pencil. The first movement of the great toe is looked for, and should be one of flexion. Also the muscles on the inside of the thigh contract. A normal reflex shows that the whole nerve tract from brain cortex to muscle fibre is intact. Its absence may indicate a break in continuity between the anterior horn neuron and muscle. If the pyramidal tract is affected between brain cortex and anterior horn neuron, we get an extensor movement of the toe (Babinski's sign), and the biceps muscle at the back of the thigh often contracts also. This extensor reflex is normal in young infants, whose pyramidal tract is not yet developed, and one may note all the toes spreading out like a fan

In testing the **knee-jerk** the patient sits on a chair and crosses his knees. The test leg must hang perfectly loose, and the patient's attention may be distracted by making him clasp his

fingers and pull hard outwards, at the same time looking at the ceiling. We may at the same time gently pull the knee-cap downwards and stretch the muscles of the front of the thigh. The tendon below the knee-cap is then tapped sharply. The knee-jerk is lost in many diseases, in all forms of neuritis and polyneuritis, locomotor ataxia, the ataxic form of general paralysis, in all diseases of the cord in which the anterior horn neurons or the posterior roots are destroyed, in complete transverse disease or injury to the cord, and in coma of all kinds. It is increased in neurasthenia, tetanus, strychnine poisoning, and in diseases of the cord affecting the pyramidal tracts, such as general spastic paralysis.

To test the **ankle-jerk** let the patient kneel on a chair with the feet hanging free. A sharp tap on the tendo Achillis causes a pointing movement of the foot. The significance of this jerk is the same as that of the knee-jerk, but it originates lower in the cord.

If the knee-jerk and ankle-jerk are very brisk one can generally obtain **ankle clonus.** Place the patient in a chair, support the leg behind the knee, grasp the toes with the other hand, and press sharply but gently upwards, holding the pressure. The foot goes into a state of rhythmical clonus at the ankle. This clonus often occurs in a normal person who is fatigued, and a spurious form (pseudoclonus) can be obtained in some cases of hysteria.

DISORDERS OF NUTRITION.

In cases of nervous disease and disorder some disturbance of the bodily health is generally present. Loss of weight, and changes indicating the defective nourishment of various parts and organs of the body, are frequent and early symptoms in many nervous and mental diseases. Nutritional disorders may also take place in the hair and nails, which become brittle. The skin may become dry and harsh, and boils and abscesses may develop. The bones also may become brittle and liable to fracture, and many patients suffering from nervous and mental diseases very readily develop bed sores, owing, in part, to the poorly nourished state of the skin. In addition to these symptoms many changes take place with regard to the various physical functions, which are not only important in themselves, but of great significance in relation to the nervous system of the patient. They should be regarded not merely as diseases of bodily organs, but as results or accompaniments of nervous or mental disease.

THE INTERACTION OF MIND AND BODY.

It has been explained how certain of the symptoms of mental disease are produced by mental strain and conflict, and the importance of psychogenic factors in the development of hysterical symptoms, obsessions, and anxiety states is now generally recognised. It remains to say a few words upon the relation between bodily and mental symptoms. The subject is specially difficult, as our knowledge of the interaction of mind and body remains very limited. In few cases of mental disorder is it safe to ignore the bodily condition; indeed, it frequently happens that symptoms which appear to be directly dependent on some mental conflict clear up directly the general health improves, or, on the other hand, long-forgotten and repressed mental experiences give no trouble until ill-health or overwork disturbs the equilibrium that has been established.

The subject may be looked at from two points of view—the effect of mind on body, and body on mind—but it is possible here to give only one or two illustrations of these two aspects of the subject.

Mind on Body.—The association of bodily changes with exposure to danger and the emotion of fear is recognised by everyone. There are pallor, collapse, sweating, tremor, erect hair, rapid pulse. All these symptoms are produced through the disturbance of the involuntary nervous system.

Other emotions have equally obvious physical accompaniments. We read how the Psalmist's bowels yearned within him; we speak of a " sickening spectacle "; and other disturbances of bodily function are common when a person is upset before an examination or appearance on a public platform.

The physical accompaniments of profound grief may also be noted: the bent head and bowed trunk, the wringing of the hands, and the inactivity of all bodily functions.

All these bodily changes, which normally are associated with the emotions and appear to be essentially connected with them, are seen in an exaggerated and persistent form in many cases of mental and nervous disease.

Body on Mind.—Here at first sight we seem on more certain ground. In most persons a stiff glass of brandy and water rapidly alters the whole mental outlook, producing an exaltation

or sense of well-being. This, we consider, is due to alcohol, which, carried by the blood-stream, reaches the brain and directly affects the function of the cells in the cerebral cortex. Likewise, in fevers we find delirium, and we conclude that toxins circulating in the blood directly damage the cortical cells. In degenerative diseases, such as general paralysis, we see mental decay march concurrently with the progressive destruction of the cerebral cortex. It is therefore easy to assume by analogy that mental disturbance generally is produced by injury to, or disorder of, cortical cells, caused by poisons or other adverse agencies carried by the blood or introduced by the lymphatics. The widely different mental symptoms produced by a single toxic agent are to be explained by the different mental make-up of the affected individuals.

But the subject is not so simple as this, and there is much evidence to show that mental disturbances may produce bodily changes, and these in their turn produce mental trouble.

An illustration of this may be given in anxiety neurosis. The leading symptoms of this are chronic fear and anxiety, and they can frequently be traced to repressed painful experiences. Associated with the fear is sleeplessness leading to fatigue, loss of strength, and marked decline in general health. There is also furred tongue, slow peristalsis, constipation, with failure of digestion and the absorption of waste products from the intestine. The ductless glands, particularly the adrenals, which are themselves controlled by the involuntary nervous system, are disturbed, both by the persistent fear and by the poisons (toxins) absorbed from the intestines. The cells of the cerebral cortex, upon which intelligence depends, may be affected by these toxins and the altered secretions of the endocrine organs, and both of these are directly or indirectly affected by mental disturbance. We there reach the position that body and mind have reacted one upon the other, and are quite unable to say where the circular chain of symptoms begins or ends.

The direct connection between bodily changes and mental symptoms is less apparent in states of excitement. Yet the observant nurse cannot fail to note the bright eye, alert expression, and erect bearing of the patient, in mild forms of maniacal excitement, and will remark on the striking resemblance between this state and that due to a slight degree of alcoholic intoxication.

It will be difficult not to conclude that in both cases some toxic

agent is affecting the cortical cells, although in the case of mania its source and its nature remain unknown.

Although it may be impossible to trace out the connection between bodily changes and mental disorders, it is quite clear that body and mind constantly act and react one upon the other. A convalescent patient gains weight, and we cannot be sure whether the mental improvement is due to the physical improvement, or the physical to the mental, or, further, whether both are improving side by side, from causes of the nature of which we are ignorant.

All evidence points to the essential unity of body and mind.

From a practical point of view we can draw one conclusion with confidence. Mental disease must never be looked at from one aspect only. We must always remember that there are both physiological and psychological factors. It is this dual aspect of the work which makes mental nursing so difficult and yet so supremely interesting.

To understand the bodily symptoms of nervous and mental disorders, it is of supreme importance to realise the part played by the involuntary nervous system. All the internal organs of the chest and abdomen, including hollow involuntary muscles such as the heart, bloodvessels, intestines, bladder, and uterus, as well as the glands, bones, skin, and voluntary muscles of the head, trunk, and limbs, have a nerve supply derived from both the autonomic and sympathetic divisions. These two act generally, but not always, antagonistically, and normally the two influences are balanced. When one or the other predominates failure of function results. The most obvious example is the heart, whose autonomic supply (through the vagus nerve) causes slowing of the beat, while the sympathetic (through the cardiac plexus) accelerates it. The walls of the intestine are moved by the autonomic, but the sphincters are controlled by the sympathetic.

But the voluntary muscles of the body have, in addition to an autonomic and sympathetic supply, a double nerve supply from the cerebro-spinal system, the highly selective voluntary movements being stimulated from the cerebral cortex through the pyramidal tract of the cord, the more automatic or unconscious movements from the basal ganglia (striate body and red nucleus) through the rubro-spinal tract of the cord. The involuntary nerve functions in muscle, whether striped or unstriped, are not well

understood, but they have an important influence on muscle tone, and a still more important influence in conveying to the brain information concerning the state of the blood in the muscles and the chemical changes going on in their fibres as the result of contraction. For these changes are the physical basis of the emotions, and upon them largely depend the "feeling tones" present in mental diseases, especially depression and exaltation. Not only so, but they are the basis of the automatic postures and movements that occur in so many of our patients. Nurses should therefore always observe and carefully analyse in their own minds such postures and actions.

POSTURES IN NERVOUS AND MENTAL DISORDERS.

Not only automatic and voluntary movements, but also postures and gaits, are brought about by strict psychological and physiological rules, and are not haphazard occurrences either in health or disease. By poets and philosophers of all times their importance has been recognised, and the difference between the "hanging head" or the "slouching gait" and the "well-set-up man" often emphasises the mind tone present in each—misery, indifference, or alert self-respect. The assumption of the erect posture by man was no sudden change, but occurred slowly through countless generations. Apes have reached only the semi-erect posture, whereas a good carriage, with head well up and shoulders back, is rightly considered one of the greatest physical attractions of man or woman, and is properly associated in the popular mind with mental activity and social usefulness. This becomes an automatic habit resulting from early training, and is easily lost by carelessness and indifference, or in old age and disease.

Abnormal postures occur in all sorts of nervous and mental disorders. Roughly, we may divide them into three groups: (1) Those arising from disease, either of muscles, or of nerve trunks from anterior horn cells of spinal cord to muscle; (2) those arising in the motor tracts of the nervous system, either brain or cord; (3) apart from the precentral (motor) area, those caused by defective action of the brain cortex, which involve "mental" abnormalities.

(1) Unusual postures may be assumed in atrophy of disuse, or in diseases of joints, by compensatory efforts of other muscles

to overcome the defects. If a " myopathy " (disease of muscle) exists there is loss of muscle fibre, and there may or may not be ncrease of fibrous tissue; if there is increase of fibrous tissue, the affected muscles may actually look larger, as in pseudo-hypertrophic paralysis, even though they may be paralysed. In disease of a nerve ending or nerve trunk we get many typical postures, such as " drop foot " or " dropped ankle," " wrist drop," " monkey-hand " (where the thumb muscles waste), or " claw-fingers " (where the long extensors keep the wrist and hand extended, but the long flexors bend the terminal joints). In disease of this type there is practically always atrophy, followed by spasticity if early recovery does not take place. In gunshot wounds of nerves, orthopædic treatment has of late made great advances in restoring the paralysed muscles to useful activity. If the disease be in the muscles, then the individual muscles or parts of muscles are affected. If it is in a nerve trunk, all the muscles supplied by that nerve suffer; the commonest paralysis of this type is the polyneuritis caused by alcohol or lead.

(2) In disease of the motor tracts between the brain cortex and the anterior horn cells of the cord we get no atrophy except that of disuse. It must be remembered that the rubro-spinal tract is connected through the thalamus with all parts of the brain, but the pyramidal tract is a newer short-circuit direct from the precentral area of the brain down through the inner capsule to the spinal cord; also that for all perfect, voluntary movements both motor tracts must be healthy. If the rubro-spinal tract is defective we get the tremors seen in paralysis agitans, but in addition we get spasticity in the later stages, often affecting the face, which is " starched " and expressionless, or the hands—the " interosseous " attitude, as in a person holding a pen. There is also drooping of the head and shoulders and the shuffling, apparently hurried (" festinant ") gait. If the pyramidal tracts are affected, as in ordinary hemiplegia, we get early spasticity and increased reflexes. The legs are generally *extended*, the foot also extended and inverted; the arms and fingers are flexed in pronation. This is commonly seen in cases of congenital hemiplegia in the wards, especially in epileptics. Sometimes there is widespread degeneration of the cord extending beyond the pyramidal tracts, and in such cases we may get a spastic, *flexed* condition of the legs, as in the final, bedridden stage of some idiots and general paralytics.

(3) The postures due to affections of the brain cortex, apart from the motor area, are by far the most common in mental hospitals, and the nurse must understand that these are highly organised habits—that is, they were originally postures used by our progenitors when a certain emotion of one kind or another was felt, and they were then appropriate and helpful in the execution of the voluntary movements excited by the emotion. Now they are no longer voluntary, or even necessarily conscious, but have become automatic. Some are purely cortical still, such as the paralyses and spasticities of hysteria, affecting no special muscles or groups of muscles supplied by one nerve, but affecting parts of the body as a whole, and they only differ from, say, the grotesque postures of the clown in pantomime in that they are not produced at will, but are beyond the patient's control. The funny man postures to produce a laugh, the hysteric to relieve some complex of the unconscious mind. Some postures, however, may not be produced in the brain cortex at all, or at least not in the supragranular layers; they may be products of the basal ganglia. We can give only a few illustrations of their occurrence in mental disorders, and the nurse is urged to look for others and try to think out what they mean.

In states of depression we may sometimes note the crouching or " adducted " attitude, with head forwards, shoulders stooping, arms flexed at elbows and pressed to side, knees slightly bent; and see how the large proximal joints are most affected. In all automatic human postures the elbows tend to bend, a relic of the time when our progenitors were ready to grasp a bough and escape by climbing. This adducted attitude is only what one would expect in mental states associated with anxiety and persistent fear, where the sympathetic division of the involuntary nervous system is in a state of overaction. Exaggerate this posture and add the voluntary attitude of trained expectancy and you get the attitude of a man prepared to start a race. The " crucifixion " and the " burial " attitudes are more highly intellectualised postures seen in depressed or stuporose conditions.

We turn to another attitude, that accompanying exaltation. Here we know far less about the internal bodily states, but we see the bright and alert eye, the moist skin, the full pulse, the " abducted " attitude, with shoulders thrown back, chest out, arms away from sides, and step free. Compare the " aggression " or " fighting " attitude in men and animals with that seen

in states of excitement, and notice the similarity of the emotions present. We assume that the autonomic influence predominates, and we know that when this occurs all the bodily functions are acting well. But we cannot yet be sure that the changes so produced cause the exaltation, for some believe that autonomic influence never reaches consciousness, that when all is going right in the body, we are never merry, but only placidly contented, and that it is a departure from this condition which produces sympathetic stimulation and so discomfort. However this may be, we see exaltation in many cases of mania, and especially in general paralysis. But note that the movements in severe states—such as acute mania and delirium—are not the voluntary movements we associate with a mental purpose, but rather the semi-automatic movements which we associate with the striate body and rubro-spinal tract.

Next take a case of advanced dementia, which we know to be associated with atrophy of the pyramidal layers of the prefrontal cortex. Here we see no paralysis, but only a want of inclination to perform any unnecessary voluntary movement; the patient falls into automatic, slouching attitudes, stimuli from the outside world do not adequately rouse him, no proper response occurs in the involuntary nervous system, and little emotion of any kind is felt. The whole state is one of sluggishness originating from failure in the highest mental areas of the brain, the association systems, the stimuli from these areas being diminished, but not sufficiently abolished to allow the lower centres to act on their own account.

There are automatic attitudes where the reinforcing power of the cerebellum is strikingly shown, and here the automatic balance is highly evident, as when a cataleptic patient without effort stands for many seconds, or even minutes, on one foot, scarcely even swaying. Automatic movements and attitudes are very common in dementia præcox.

The last illustrations of movements and postures in mental diseases will be taken from those seen in the epileptic fit. Usually, when the brain storm, the explosive discharge from neurons all over the brain, has occurred, there is profound exhaustion, even the medulla being affected, as is shown by the slow, full pulse and stertorous breathing. But as recovery occurs, before consciousness reappears, an automatic stage often intervenes in which highly organised movements—such as walking

or undressing—are performed. In slighter fits, which perhaps do not touch the motor areas at all, and of which momentary unconsciousness has been the only sign, these movements may be most complex, and they reach a climax in automatic states which may last for many days, so that a patient may be found wandering, with no knowledge of his identity, in a part of the country far distant from his home (fugue).

During the progress of the major fit interesting tonic convulsive postures may appear, due to irritation of the centres round the central canal of the midbrain. The legs are fully and stiffly extended, the toes turned in, the arms either flexed across the chest and the fingers clenched, as so often happens in man (see climbing posture, p. 395), or extended by the sides, with the forearms in extreme pronation and the palms turned outwards. Peculiar writhing movements appear as the centre of irritation moves down the brain. The head and eyes turn to one side, and when the discharge of nerve force passes to the other side of the brain, the head and eyes turn to the other, always to the more irritated, side.

OTHER BODILY SYMPTOMS.

In the internal organs autonomic and sympathetic disturbances result from interference with the secretion of "hormones" or ferments, upon which digestion and other bodily processes depend, and as a result we see many changes accompanying mental disorders.

Secretory.—In melancholia the saliva is decreased in amount; and, often, the secretion of other digestive juices is insufficient or disordered. This partly accounts for the indigestion and loss of appetite which are met with. The fact that in some cases—for example, of stupor—there is a constant dribble from the corners of the mouth (salivation), does not necessarily indicate an increase in the amount of saliva secreted but may be due to the patient's refusal to swallow it, or his inability to do so because his pharyngeal reflexes are diminished. Disorders of the alimentary system are very common in mental disease. Digestive troubles of all degrees of severity are frequent. The tongue is often furred, and the breath offensive from fermentation of food within the stomach. Vomiting of partly digested food may occur in severe cases. Constipation is commonly met with in all forms of acute

mental disease, and is an almost constant symptom in melancholia.

Circulatory.—The pulse-rate is frequently increased, and this is especially common in acute mania and in the agitated forms of melancholia. In other mental disorders—such as stupor and severe forms of dementia—the circulation is often very sluggish, while the pulse diminishes in frequency, and the extremities become cold and blue. A considerable degree of anæmia is met with, and in some forms of mental disease there is a large increase in the number of white cells in the blood, suggesting that some poison is attacking the body, which the white cells are making an effort to overcome.

Respiratory.—In stupor and in many cases of dementia the respirations are shallow, and the lungs never become fully inflated with fresh air. This has an important bearing on the fact that many such patients are prone to suffer from consumption.

Excretory.—The urine is often diminished in quantity in melancholia, but in some other disorders—such as hysteria and general paralysis—an increased secretion may be found. In some forms of insanity there is a deficient excretion of urea.

Reproductory.—In the majority of cases of acute insanity menstruation is disordered. In melancholia and many other forms of insanity it is frequently absent. It should be kept in mind that, as a general rule, in nervous and mental diseases cessation of the menstrual function must be regarded as a symptom, and not as a cause.

It may be added that the whole physical aspect of patients may alter and deteriorate as a result of their malady. In sufferers from chronic mental disease the features and the expression may become degraded and even exhibit characteristics generally associated with criminal types.

STIGMATA OF DEGENERATION.

As no satisfactory development or growth of the body can go on without healthy action of the nervous system, we find, as would naturally be expected, that an individual whose brain has been defective from birth, or whose brain development has become arrested in infancy, shows certain bodily abnormalities which distinguish him from the ordinary person. These are known as the **stigmata of degeneration,** and they are present in

varying degrees in a considerable proportion of the people who suffer from mental deficiency. Among them may be mentioned the following: an unusually large or small head; various abnormalities of shape in the head and face—such as a very low sloping forehead, a disproportionally large face, projecting upper or lower teeth, protruding jaws, dissimilarity between the two sides of the face, the eyes set on different levels or obliquely, etc. Abnormal or excessive hair on the face of the female, and the absence of hair on the face of the male, are considered to be stigmata.

In the ears many abnormalities may be seen, the most obvious of which is inequality of size. The ears may be too large, they may project unduly from the sides of the head, or they may be abnormally small; the lobe may be under-developed, adherent instead of hanging free, or even absent altogether. The roof of the mouth, or hard palate, is frequently deformed; it is often narrower than usual, and also high and pointed as it arches across the mouth, instead of wide and open with a moderately high vault. The teeth are apt to be irregular and badly placed, and delayed dentition may occur.

Deviations from the normal in the shape of the chest and limbs, the number of fingers and toes, etc., are to be regarded, where not due to accident or bodily disease, as stigmata of degeneration. It must be remembered that it is only when an individual bears many of these stigmata that we can regard them as important and term him a degenerate. One or more of them may be found in people who are, nevertheless, perfectly normal in mind.

DISORDERS OF MENTAL FUNCTIONS.

We must now consider the symptoms which accompany disorders of the *mental* functions of the nervous system, or, in other words, mental disease, and the disordered mental functions by which it is characterised or into which it may be resolved. For the sake of convenience and simplicity, we shall, as far as possible, discuss these functions separately; but as it will, of course, be understood that no such separation can be made in actual practice in any given case, we shall first deal briefly with the general mental state in persons whom we call insane. The old word "lunacy," which should not now be employed, was used to express the idea of insanity, and was based on the

erroneous notion that changes in the mental state occurred in connection with the changes of the moon (*luna*). Alienation, a word which means estrangement from the normal state of mind, is also sometimes used, and physicians who have to do with the insane are frequently spoken of as alienists.

It is quite impossible to give any simple and satisfactory definition of insanity. Its causes are by no means fully known, its symptoms are almost infinitely varied, and there is no sharp dividing line between the sane and the insane. Maudsley's definition remains as good as any and better than most, and is as follows: "Insanity is such a derangement of the leading functions of thought, feeling, or will, together or separately, as disables the person from thinking the thoughts, feeling the feelings, and doing the duties of the social body in, for, and by which he lives."

It will be clear from this definition that the question of a person's sanity or insanity must be considered in relation to the community of which he is a member. The real point at issue is whether he is able to conform to its general standards of life and conduct, and adapt himself to the social environment which these create. Here, as we shall shortly see, the only final test is his actual conduct. Thus, to state an extreme case, a man may see no wrong in theft or even murder. But so long as he refrains from stealing or killing, he is not placed either in prison or in a mental hospital, since, so far as his conduct goes, he has obeyed the regulations imposed on him by society. This holds good with regard to what are generally known as "borderland" cases. There are numbers of individuals whose disordered ideas and thoughts certainly affect their conduct, but not to such an extent as to cause any great harm to themselves or any serious hurt or annoyance to the community as a whole. They may be cranks or faddists, or people who are more than usually concerned about their bodily functions, or eccentric in some other way. Many hysterical persons come into this category, and also persons who have slightly damaged their brains by, for example, excessive drinking, and whose self-control or power of judgment is weakened in consequence. These may all show disordered mental functioning in varying degrees, but as they are able, with more or less success, to adapt themselves to their surroundings, they cannot rightly be called insane.

Estimation of the Mental Condition.

From what has been said, it is clear that a person's mental condition can only be rightly estimated when his present state is considered both in relation to his previous conduct and mode of life—when he was admittedly normal—and in relation to his present surroundings. One of the most interesting and important duties of a mental nurse is to form a correct estimate of the patient's actual state of mind, and as experience is the best teacher, that duty should be systematically carried out on every possible occasion. Speaking generally, it involves careful observation of the appearance, the conduct, and the conversation of the patient. Visible signs of a person's mental and emotional state are generally written large in his face, his expression, his attitude, his dress, the movements of his hands, and many other small points which will be readily apparent to the careful observer. It is quite surprising how much information can be gained in this way, and how much can be lost through carelessness. Observation of the patient's conduct is also of supreme importance, and in many cases may alone be sufficient evidence of his mental state. It must, however, be remembered that at early interviews one is seldom in possession of enough information to understand all the motives for seemingly unusual behaviour, or to know how the patient's present conduct compares with his conduct when he was quite well. For example, one may see very little amiss with a patient, who is talkative, friendly, and open, immediately upon admission, unless one knows that all his life he has had the reputation of being intensely shy and reserved with strangers. In nearly all cases, however, especially at the earlier interviews, it is chiefly by what a person says that his mental state can best be judged.

It has to be remembered that many insane persons are very secretive, and are quick to suspect that they are being cross-questioned. They avoid inconvenient questions with great cleverness, and often do their best to conceal the beliefs which they know are regarded by others as delusions. It therefore requires much skill, tact, and experience to ascertain the real nature of a person's thoughts and beliefs from what he says. The circumstances of the interview must, of course, be taken into consideration, and allowance made for the natural reticence and reserve of anyone who is being questioned by strangers.

Again, it is important to be sure that apparent delusions on the part of the patient may not on careful inquiry turn out to be real facts. The ability of a patient to conceal his symptoms may be very great. A common and dangerous instance of this is the melancholic, who, though to all appearance practically normal at an interview, may nevertheless be so depressed as to be meditating immediate suicide. Sometimes valuable evidence of the mental state may be obtained from the letters or handiwork of a patient, when it cannot be got from his conversation.

The following table may be helpful in preparing a report.

(1) By observation the nurse can note the following important points, among others, concerning the patient:

General appearance, attitude, tidiness, restlessness.
Facial expression, colour.
Nutrition, any bodily peculiarities.
Actions, behaviour, conduct.

(2) By ordinary conversation on general topics the nurse can learn much regarding the—

Power of attention, and understanding.
Emotional state—depressed, sulky, happy, etc.
Power of connected thought, reasoning, and judgment.
Consciousness of surroundings, orientation.

(3) By special inquiry the nurse can investigate the state of the patient with regard to:

Memory.
Presence of hallucinations, delusions, or obsessions.
Presence and degree of self-control.
Presence of suicidal tendencies or other impulses.

We shall now proceed to discuss in detail the disorders of the various mental functions.

Disorders of Perception.

Alterations in acuteness of perception are common in both the sane and insane.

Thus, patients convalescent after a long illness are often so sensitive to external sounds and sights that an ordinary footfall may be almost intolerable, or daylight intensely distressing to the eye. The insane, however, are more apt to be extremely deficient in sense perception. This is shown, for example, in the diminished sense of pain that is found in many patients.

They may burn themselves deliberately, or they may undergo the opening of an abscess or the pulling of a tooth with apparently little or no suffering. Again, in the state known as stupor, not only the mental processes, but various powers of perception, seem to a great extent to have ceased to function. This is also characteristic of extreme cases of dementia, in which external circumstances produce little impression.

An **illusion** is a false perception. Perceptions, as we have seen, are made up from sensations. Sensations of redness, hardness, weight, for instance, are compared with previous similar sensations and finally interpreted into a perception of a book. When this interpretation is a mistaken one, the result is an illusion. Thus I have a perception of an object of a certain size and shape and blackness in the corner of the room; I interpret this, in the uncertain light, as being a hat, but it turns out to be the cat. I have therefore been suffering from an illusion of sight. Illusions may affect the various senses: thus a rumbling sound may be mistaken for thunder, and a very cold piece of metal may feel as if it were actually burning the hand. In the sane, and in normal conditions, such illusions are quickly dispelled or corrected by further investigation and by the use of the reasoning powers. But in the insane very frequently the case is otherwise. The pattern of the wall-paper may be interpreted as faces which are staring at the patient, and he may be quite unable to correct that impression. The howling of the wind may seem to him the crying of a forsaken child, and even some internal sensation may be misinterpreted, as when he ascribes the pain of an attack of indigestion to the gnawing of rats inside his body. It is probable that many delusions relating to the internal organs depend upon illusions in this way.

Hallucinations.—A hallucination is a perception without any external object or cause. If a person is sure that he hears a voice when, as a matter of fact, there is no one speaking, he is said to have a hallucination of hearing. It is not a question of a sight or a sound being misinterpreted, as in the case of an illusion, but of the stimulation of one of the special senses—*e.g.*, having sensations of sight or smell without external cause for them, so far as can be ascertained. Hallucinations are important symptoms of insanity, and greatly influence the beliefs and behaviour of patients. In certain cases the whole conduct is dependent upon the hearing of voices which tell the patient to do certain

things, and dangerous acts of violence may occur in consequence. All the special senses may be affected with varying degrees of frequency; but hallucinations of hearing are the most common and occur in great variety. Sounds of all kinds may be heard—sometimes very quiet whisperings, sometimes clear voices, which the patient often claims to recognise. He may blame the nurse sitting quietly beside him for making some insulting remark, or may carry on a conversation with people who are absent or dead. The voices may accuse him, or may speak of the most ordinary things, or utter imperative commands, which he feels impelled to obey.

Next in frequency come hallucinations of sight, which may be merely flashes of light, or definite images of persons and things. They occur in cases of acute illness or delirium—for example, in delirium tremens, in which, as is well known, the patient sees terrifying visions of reptiles, vermin, and devils. Hallucinations of taste and smell usually occur together, and are not nearly so frequent as those already mentioned. The cases in which they are met with are generally chronic, with a bad outlook as regards recovery.

Hallucinations are very rare indeed in people of sound mind when in the waking state. They are said to occur in some persons when they are tired, and they can be produced temporarily by certain drugs, such as Indian hemp and chloroform, although in these cases the patient cannot be said to be fully awake. Several well-known historical personages are said to have experienced hallucinations—*e.g.*, Joan of Arc, Martin Luther, George Fox—and cases have been recorded of individuals who were able to produce hallucinations at will. When dreaming, or on the point of falling asleep or awaking, hallucinations are common, and in no way abnormal.

Hallucinations in the insane are usually in harmony with the patient's beliefs and emotional state. For example, a patient in a state of great depression may hear a voice telling him he is an outcast and will be sent to prison, or accusing him of crimes. False perceptions frequently affect more than one sense simultaneously. Thus, a sufferer may hear voices denouncing him, see horrible faces, feel the crawling of vermin, and complain of obnoxious smells in the room. Sometimes, as in cases of delirium, the hallucinations are variable and fleeting, and they may be either pleasurable or painful in their nature. As a

general rule, patients do not experience hallucinations when intently occupied, but much more commonly at night or when alone. In some cases the whole attention is taken up with listening to and answering the voices, to the exclusion of all other matters.

The insane accept their hallucinations as real experiences with little or no hesitation, and in this way the false perception rapidly becomes a false belief. For example, a patient who hears voices abusing him soon concludes that they are the voices of people just out of sight; and the patient who sees faces of friends naturally believes that they have actually visited him. These false beliefs are known, as we shall see later, as delusions, and they commonly arise in this way as the result of hallucinations.

Evidence of the Presence of Hallucinations.—As a rule, a patient suffering from hallucinations reveals the fact distinctly by his actions, statements, or complaints, but sometimes, especially in the case of hallucinations of hearing, he may not only refrain from mentioning them, but may avoid the subject and take great pains to prevent other people from discovering their existence. He may do this because he is aware that they are considered a symptom of insanity, or because they deal with secret and private affairs. It is of great importance to discover whether a patient is really the victim of hallucinations, and it is often very difficult to be certain on the point. An observant nurse will notice many small peculiarities in the patient's behaviour which will help him to come to a conclusion on the subject. A patient who is concealing hallucinations may often be noticed to turn his head sharply, as if to catch a word, or to smile or frown to himself, in a way that cannot be explained by ordinary circumstances. His whole attitude may be one of rapt attention, and he may look with a questioning air in the direction from which the supposed voices are coming. Talking to oneself is not necessarily evidence of hallucinations of hearing, because many sane people do this when in deep thought; but if the speaking be of the nature of a conversation, such as may be heard when a person is speaking through a telephone—silences followed by replies addressed to someone who is not present—it is almost certain that the patient is subject to hallucinations.

The persistence of hallucinations without change for more than five or six months is usually an unfavourable sign as regards

recovery, and the appearance of hallucinations in young persons apparently in good health is also generally considered a grave sign. In the chronic forms of insanity hallucinations of hearing are the most frequent, and in every hospital there are cases in which these are the most striking symptom. Hallucinations of sight are frequently experienced by epileptics, and sometimes the same hallucination is repeated before each fit, so that the patient is warned of what is impending.

Disorders of Consecutive Thought.

In health, people vary greatly in the manner in which they think. Some think rapidly, others slowly and deliberately. In some the train of thought is clear and orderly; while in others, apparently, it is confused and disordered. These differences are much exaggerated in the insane, and the various kinds and degrees of disordered thought must now be described.

Acceleration.—The normal process of association of ideas seems in some forms of insanity to be greatly increased in rapidity. Ideas flow very quickly, and the patient speaks with unusual speed. There is such a wealth of ideas crowding into the mind that one suggests and displaces another with great rapidity; but generally the train of thought has no definite end in view. The flow of words continues undirected and unchecked, and may be compared to a "racing" engine which is working correctly enough, but at an uncontrolled speed and without any useful aim. This state of affairs is known as acceleration, and is often spoken of as "the flight of ideas." The next stage is incoherence, which may often be merely an exaggeration of the above condition. The ideas succeed one another so rapidly that it is impossible to follow their associations with one another, and thus they seem to be merely jumbled and disconnected sentences or phrases. It should be remembered, however, that in probably every case there is some connecting-link that cannot be traced between the different ideas expressed.

Retardation.—At the other extreme we have retardation, a state in which the association of ideas is very much slower than normal. To the simplest question, in such a case, the patient frequently gives no immediate answer, but after a long interval he may utter a disjointed word or two. Even when, as is often the case, he understands the question and wishes to answer it, his train of thought may be so slow and so laborious that he is

unable to do so. Of course, failure to reply to a simple question does not necessarily indicate retardation, but may be due to many other causes.

Confusion.—In such states as retardation and acceleration, we have seen that the power of associating ideas remains unimpaired, although apparently it is working either with abnormal difficulty or at too great a speed. There are conditions, however, in which the whole process of thought seems to be completely disorganised, and no sequence whatever in the train of ideas can be discovered. This is confusion, and may be seen in all its stages in different patients. A mild degree of it is sometimes known as **disorientation.** This condition has been well compared to the state of mind in which a normal individual might find himself on emerging from an underground station in the midst of a completely unknown city. It would take him a considerable time to fit things into their right places in his mind and to come to a clear understanding of his surroundings. An extreme degree of confusion is present in delirium. This is a state in which, as we shall see later, the working of the whole mental apparatus becomes disorganised. It is no longer a harmonious whole, but is split into a number of separate units, each pursuing its own line of activity. Delirium is usually associated with severe bodily disease and disorder, as in pneumonia and typhoid fever, and is often induced by poisons of various kinds, such as alcohol. Any great degree of confusion is generally accompanied by hallucinations of a fleeting nature. It is an interesting fact that many patients can conduct a long and rational conversation without betraying that they are utterly confused as regards time, place, etc. This is especially true of alcoholic cases.

Faultiness in personal habits, when not due to bodily disease or extreme weak-mindedness, is often a sign that the patient is suffering from a considerable degree of confusion.

Attention.—The power of attention is very readily impaired or lost among the insane. This statement may be tested by engaging a patient in conversation or argument, when it will often be seen that he is quite unable to keep to the point, but may either manifest complete indifference or flit from topic to topic as ideas pass through his mind. The state of confusion produces a similar effect; and patients suffering from simple mania, which will be described later, illustrate this inability to give sustained

attention to any subject for more than a few moments. There are some cases, however, notably among patients in a state of melancholia, where the attention is completely concentrated on one idea or group of ideas. Many depressed patients are so absorbed by some painful thought, or so wrapped up in the contemplation of their own unhappiness, that it is almost impossible to rouse them or make them aware of what is going on around them. This may be expressed by saying that they are not **distractable.** A patient whose attention can readily be turned from one subject to another is said to be distractable, and this condition is often admirably illustrated in patients who are in states of maniacal excitement. A case of simple mania can often be induced to laugh, weep, sing, pray, curse, and so on in quick succession by having his attention distracted—switched off, that is to say—from one idea to another. This is a point of the utmost practical importance for nurses. If it is remembered that with judicious and tactful persuasion and suggestion a patient in simple mania can be induced to do almost anything, much trouble will be avoided.

Disorders of Memory.—Defective memory is a common failing. We are all worried at times because we cannot remember something which may be important or trivial, or have forgotten an appointment. In some cases of mental disorder the failure of memory is extreme, and occasionally it is the leading feature of the disease.

Loss of memory is termed **amnesia,** and it may be temporary, or persistent, or progressive.

Temporary loss of memory is common after injury, and frequently a person who has met with an accident cannot recall the incidents which preceded it. In epilepsy, the patient is entirely unconscious during the fit, and remembers nothing of what has happened. He may, when recovering, perform various automatic acts; he may, for instance, attack or even murder a bystander, but afterwards he will not have the slightest recollection of what he has done. In many forms of acute insanity patients do not remember what has taken place during their illness, and often days, and even weeks, are entirely blotted out. This is most marked in delirious cases and in patients who are confused. It not uncommonly happens that one or two incidents only are remembered in the course of a long illness, and sometimes these memory impressions may be so imperfect that they give rise to false accusations.

In many alcoholic patients there is serious impairment of memory.

Progressive loss of memory occurs in a number of conditions, such as general paralysis and senile decay. Loss of memory of recent events is a common sign of advancing years, and, in some cases it becomes so extreme that the patient cannot remember where he is or what he had for breakfast, or the names of those in daily attendance upon him, although he may recollect events of many years ago with perfect clearness. This condition is spoken of as loss of recent, but retention of remote, memory.

Distorted Memory.—In some cases of defective memory, the patient, on being asked questions, fills up the gaps in his recollection with entirely fictitious statements. This is most commonly found in certain types of alcoholic insanity.

Dr. Mercier relates the following case: "A patient suffering from dementia due to alcohol had a struggle in a carriage, in the course of which his finger was dislocated. A few days afterwards, on being asked how the injury occurred, he gave a detailed account of tripping on a loose stair-carpet and falling forwards." Erroneous reminiscence such as this is common in insanity and in other allied states, and results in many baseless accusations of ill-treatment.

Epileptic patients, in like manner, sometimes make entirely false accusations against those who have attended them in a fit. The nurse must understand that such patients are not wilfully lying; they may have no intention to deceive or even to prevaricate, but their false statements may arise from a distorted or disordered memory of what has happened. Considerable injustice may be done to patients in thought, if not in deed, through the hasty conclusion that their assertions are malicious and intended to cause trouble.

Delusions.

A delusion is a false belief resulting from or associated with a diseased condition of the mind. For instance, if a man is convinced that he is the king of the universe or that he has no liver, it is clear that he is mistaken, and we therefore call his beliefs delusions. We have already seen that such false beliefs may spring from hallucinations, and also that they may come about as the result of defects in memory. There are many cases, however, in which they cannot be traced to such sources, and we must now study this very important symptom in some detail.

Every false belief, of course, is not necessarily a delusion. We are all liable to make mistakes and to hold incorrect opinions. But false beliefs which arise from imperfect knowledge or faulty reasoning can be rectified by explanation or further investigation. A delusion, on the other hand, is not susceptible to proof or argument, and is held in spite of the clearest evidence of its mistaken nature.

Even a false belief held permanently may not denote insanity, since it may follow naturally from the education and social environment of the person who holds it. For example, the belief in witchcraft, formerly so common in this country, and still more or less prevalent in remote districts, is erroneous. If a superstitious peasant expressed his belief in the existence of witches who could cause the death of cattle by their spells, it would be no proof of his insanity. But if an educated, scientific man gave utterance to the same opinion, it might certainly be considered evidence of unsoundness of mind.

In some cases the delusional nature of a belief can only be recognised by comparing it with former convictions.

A common instance is a patient's conviction that he is utterly unworthy, and that there is no hope for him in this world or the next. It is frequently found that such a conviction is entirely opposed to his religious faith before his illness. Generally the holder of a delusion needs no proof in support of it: his own certainty is sufficient. If attempts are made to show him that he is mistaken, he may listen quietly to the arguments used, but serenely reassert his original opinion, and finally say with perfect confidence, " I know I am right."

An accurate and comprehensive definition of a delusion, it will be seen, is a matter of considerable difficulty. We may quote the definition given by Sir Thomas Clouston. A delusion is " a belief in something that would be incredible to people of the same class, education, or race as the person who expresses it, the belief persisting in spite of proof to the contrary, this resulting from diseased working of the brain convolutions." The last phrase in this definition is of much importance, because it indicates the pathological or morbid nature of such false beliefs.

In some cases the delusion seems to be the outcome or development of an existing morbid condition. For instance, a patient may try to account for the fact that he is feeling thoroughly depressed and miserable, and at last a delusional explanation of

his suffering is evolved. He begins to look upon it as the result of previous wrong-doing, and soon he is convinced that he is being judged and punished for past sins. As, however, this conviction affords him no relief, it is but an easy step to the further delusion that he has committed the " unpardonable sin," and is lost for ever.

In other cases, but less frequently, the delusion appears to arise suddenly in connection with illusions or hallucinations. This has already been mentioned, and we have seen that there is frequently an intimate connection between hallucinations and delusions, and that they seem to appear simultaneously. Something seen or heard during delirium, or an idea presented to the mind in sleep, may become the basis of a delusion which may last for years.

In many other cases delusions are of very slow growth, and it is impossible to say when they first appear. Not rarely, intimate friends and relatives are unaware of their existence, until some strange remark or action attracts attention, and inquiry reveals the presence of fully developed delusions. Then, on looking back, it becomes clear that they have been of long standing, and very probably a number of singular incidents will be recollected which evidently were symptoms of mental disorder which at the time was altogether unsuspected.

In certain cases of insanity the delusions are dependent one upon another, and are slowly developed into a system. The primary morbid belief results in the gradual growth of a number of secondary ideas. Thus, a delusion of suspicion gradually gives rise to delusions of persecution, and then, possibly, delusions of grandeur develop. In such a case the delusions are said to be **systematised.** When they are independent of each other, and not woven into one system of delusional ideas, they are sometimes said to be **non-systematised.** A **fixed** delusion is one that does not alter from day to day, and delusions are said to be **fleeting** and variable when they come and go, lasting but a short time, and constantly changing in character.

From what has already been said, it will be clear that delusions are very varied in character, and may be related to all forms of human experience. Various attempts have been made to classify them into groups, but this is somewhat artificial and useless. They may be roughly classified, however, as those relating to the patient himself and those relating to his surroundings. Under

the first heading would come such delusions as a patient's belief that he was in reality some other person, that some part of himself was changed, that he had no inside, that his brains had been removed, that he suffered from some serious ailment or disease, that he was an exalted personage or possessed of great wealth, that he was an outcast unworthy to meet anyone, that he had committed a great crime, or that he was about to be tortured and punished. Into the other class would come such beliefs as that his friends were unfaithful, that there was a plot to injure him, that he was being subjected to such influences as electricity, hypnotism, wireless telegraphy, or X rays, or that conspirators read his innermost thoughts.

Delusions of Special Importance.—There are certain delusions which, from their frequency or great importance, require special mention. Among these are all delusions which are associated with a depressed state of mind. Patients who believe that they are outcasts and unfit to associate with others, or who expect shortly to suffer the punishment of their imagined crimes, are very likely to attempt to commit suicide. **Delusions of suspicion** are also very important. These frequently arise gradually. The patient begins to doubt the good faith of those dear to him. Every little act is soon misconstrued, a hidden meaning is seen in whatever happens, and he finally becomes suspicious of everything and unable to trust anybody. Such a patient is very hard indeed to influence, and as one's best efforts are viewed with distrust, the task of winning his confidence is extremely difficult. To persevere in it requires no little patience and endurance.

Patients with **delusions of persecution** are apt to be dangerous, and require special care and treatment. The danger lies in the fact that such a patient may at any time concentrate all his suspicious dislike on a particular person, who, he imagines, is heading a conspiracy against him. When this happens, a sudden homicidal attack is not at all unlikely. Many patients who suffer thus are extremely intelligent, and they sometimes take great pains to conceal the existence and nature of their delusions from those about them. It therefore becomes a matter of the greatest practical importance to ascertain what those delusions really are, so that appropriate measures can be taken and needless difficulties in management avoided.

DISORDERS OF VOLITION.

Inertia.

Some patients find it extremely hard to come to any decision. They cannot make up their minds to perform the most ordinary acts without much hesitation and waste of time. The man who is reported to have spent half the morning in making up his mind which leg to put into his trousers first is only an extreme illustration of this symptom, which is far from uncommon. In many cases the patient is unable to undertake ordinary work, and if a start is made he soon breaks off, saying he cannot continue. He can generally give no reason for this. Sometimes under pressure the work is done, but with extreme difficulty. The next day, perhaps, it is not attempted. This condition resembles the lassitude produced in normal persons by great fatigue, but in our patients it may occur the first thing in the morning, after a good night's rest. The reader should compare it with the description given on p. 406 of retardation, with which it has much in common. It should be noted that patients in this state are often very anxious to occupy themselves, and are much distressed by their inability to do so. There is no indifference or carelessness, and no wish to shirk their duties; and they are vividly conscious of their ineffectiveness. They are by no means to be regarded as idlers who *will not* work, but as patients who would gladly work if they could.

Stupor.

Inertia, or will-lessness, as we may call it, may go to very great lengths, and the patient may exhibit the condition known as stupor, in which, although conscious, he seems to be utterly and completely indifferent, both to the needs of his own body and to all that goes on around him. He may stand or sit motionless for hours, saying nothing, and apparently hearing and seeing nothing; his hands are blue and cold, and saliva dribbles from his mouth. He pays no attention to the calls of nature; he passes urine and fæces unheeded, and if food be placed in his mouth it probably remains unswallowed. He ignores external noises and what is said to him; gives no sign of pain when pricked with a pin or severely pinched, and will only walk with slow, dragging steps if assisted or pulled along.

When once the nurse has seen such a case of stupor, it will not readily be forgotten. Sometimes there is an even more exaggerated impairment of the will. The patient does not merely suffer from an intense inertia in which he passively ignores all that happens, but he shows a dull, mechanical, obstinate resistance to whatever is done for him or whatever he is asked to do. This state of **resistiveness** is quite common among the insane, and often accompanies stupor. If the patient is taken for a walk he will hang back, and have to be pulled literally every step of the way. If the attempt is made to raise his arm, he resists it with all his strength. It requires physical force to make him sit down if he is standing, or get up if he is sitting. Most troublesome of all, he is very likely to refuse food, and a large proportion of the patients who have to be tube-fed are in a resistive state. A final, very extreme degree of it is known as **negativism.** A patient in this condition will actively attempt to do the exact opposite of what is required of him, and such cases are among the most difficult and trying with which the nurse has to deal. Even here, however, there is ample scope for readiness and resource. For example, a patient suffering from negativism was being kept in bed by four or five nurses, who were continually restraining her efforts to rise. The nurses were removed, and the patient was suddenly seized by the hand and pulled vigorously out of bed. She immediately dragged herself away, rushed back to bed, and lay down beneath the clothes. Use was thus made of her condition to bring about the desired result.

Impulse.

The symptoms which we have been describing may be regarded as the results of an impediment or impairment of will-power or volition. We have now to consider another series of symptoms, which are due to the faulty discharge or control of energy. One of the most striking of these is **impulsiveness.** This has various degrees. An impulsive patient may be merely noisy and restless, or aggressive and occasionally violent on very slight provocation. He may suddenly fly into a rage at the least remonstrance or interference with his wishes, or he may attempt to bully or maltreat those about him. He is erratic, uncertain, and completely unreliable.

There is a condition of impulsiveness which is even more dangerous, because it is often seen in patients who are ap-

parently quiet and normal, and even in stuporose patients who might be thought incapable of any sudden act or movement. Yet, without the slightest warning, they may spring up or leap out of bed, and perhaps rush to a window and endeavour to smash it or jump straight through it. Again, they may suddenly attack a nurse or one of their fellow-patients. It is the complete absence of warning that makes them so difficult to deal with. The nature of the impulse may vary, but it is frequently either suicidal or homicidal. Similar attacks may occur in states of confusion and delirium, and in alcoholic intoxication, but in these cases the patient is either unconscious or only partly conscious, and is quite unable to control the impulse. In the condition of impulsiveness described above, however, he is sometimes quite aware of what he is doing, but it is usually impossible to obtain any satisfactory explanation of his motive. Very often, on the other hand, his mind is a blank with regard to the whole incident, and he may deny in perfect good faith that it ever occurred. In a certain number of cases impulsive conduct may be due to some vivid hallucination. In one instance, a patient suddenly ran away and jumped from the top of a high rock because, as he explained later, he heard the "voice of God" telling him to do so.

Destructiveness.

Some patients have an irresistible tendency to deface and destroy all the objects about them, and may spend their whole time in tearing up sheets and blankets, picking at the walls, tables, or chairs, and playing havoc with their clothing and with everything else that they can lay hands upon.

Restlessness.

Restlessness is a predominant symptom in many patients, and is observed in various kinds of mental disorder. Sometimes restlessness and agitation are the outward expression of mental distress. The patient sits rocking to and fro unhappily twitching his fingers; or perhaps he paces backwards and forwards, wringing his hands and moaning, looking the picture of misery. Often patients of this type cannot rest day or night. They can settle to no occupation; they take no interest in anything outside themselves, and are never still, standing or running about even at meal-times. At night they are constantly in and

out of bed; they cannot sleep themselves, and will not let others do so. Restlessness and aimless wandering about are also a prominent feature in many cases of senile insanity.

Stereotyped Movements.

Stereotyped movements are another very interesting sign of faulty control of energy. These are movements which are constantly repeated by the patient in exactly the same way. They vary in character from mere grimaces or gestures to strange peculiarities in gait or purposeless actions, such as rubbing the hand or head or rocking the body. Often the constant movements produce physical effects, such as bald places on the scalp, sores on the face, or patches of thickened skin on the hands.

Sometimes it is not an action, but a sentence or a phrase which is repeated over and over. The patient takes no notice of any answer or argument offered by others, and this shows that though the words he utters may be sensible enough in themselves, they are repeated automatically without any real attention to, or understanding of, their meaning. Few things are more trying than to listen for any length of time to a patient suffering in this way.

Obsessions.

We have now to consider what are called obsessions, which are in many ways allied to the stereotyped movements and actions of which we have just spoken. An obsession is an idea which obtrudes itself into the mind of the patient with irresistible force, but of whose absurdity and dominion over his will he is quite well aware. The last clause of the definition shows the difference between an obsession and a delusion, and should be carefully borne in mind. The patient with obsessions knows that they are foolish and morbid, and frequently begs to be relieved of them, whereas the patient with delusions considers them perfectly natural and correct. The great majority of persons suffering from obsessions are not insane, and do not enter mental hospitals, as they are fully capable of looking after themselves, but now and then the erroneous idea so completely monopolises the attention of the individual under its influence, or causes him to behave so strangely, that he becomes unfit to be at large. Many obsessions are to be noticed among the insane. For example, some will always walk along a defined route, or touch certain things as they pass through a corridor; some feel

compelled to lie in bed in a particular way, and others must kneel down at certain places or times. In a slight degree we can all realise what it means to be the victim of an obsession, because we are all more or less subject to ideas which temporarily dominate us in this way. A jingling rhyme may "get into our heads" and reiterate itself against our will, or a fragment of a tune may persist in haunting our consciousness. Again, we have all been troubled by repeated doubts as to whether, for instance, a letter was put into the right envelope or whether the gas was turned off at night; and these doubts tended to return even after we had satisfied ourselves upon the point.

Obsessions may be grouped roughly into three classes: First, there are **intellectual obsessions,** which are not accompanied by acts. The consciousness of the patient is merely dominated by some idea which is false and which he knows to be false, but of which he cannot rid himself. To take an illustration, the thought may constantly recur to his mind that if a certain trivial thing had been done long ago, all would have been well with him; and by no effort can he banish this notion for more than a short time.

Secondly, there are **impulsive obsessions,** in which the imperative idea tends to be expressed in action. The patient may struggle for days or weeks against a strong desire to do something which he knows to be foolish, such as picking up and reading pieces of paper seen in the street, or stepping over joints of paving-stones, till finally he gives in, performs the act, and attains comparative peace until again the desire becomes irresistible. Some of these impulses have received special names—such as **kleptomania,** the desire to steal articles without motive; **pyromania,** the desire to set things on fire.

Thirdly, there are **inhibitory obsessions,** characterised by the inability to undertake some ordinary duty or perform some accustomed act. These include various morbid doubts and fears, one of the commonest being the fear of receiving infection from touching certain things. This is generally accompanied by constant washing of the hands, and if the unnecessary ablutions are prevented the patient suffers acute distress. The well-known dread of open spaces or of small rooms also comes under this head.

The statement may perhaps be repeated that obsessions, although often seen in the insane, are not to be regarded, as a

rule, as a symptom of insanity. They occur very generally in persons who are well able to discharge the responsibilities of life, and the great majority of people suffering from them are not and do not become insane.

DISORDERS OF THE EMOTIONS.

Emotional disturbances are very frequently met with among the insane. They are often the chief symptom in a case, and may so dominate it that the accompanying intellectual disorder or other symptoms are obscured. The departure from the normal may be in the direction of increased or of decreased intensity, or of perverted emotions.

Affective Loss.—In many patients there is a great dulling of the emotional life. They become less and less responsive to their surroundings, and their capacity for experiencing pleasure, pain, love, and hate is very much reduced. This is usually seen in cases of general mental enfeeblement, but there is a peculiar emotional indifference which may be an early sign of the condition known as **dementia præcox.** Here patients, although fully conscious of all that is going on, lose their interest in events, do not care what happens, and pay little heed to the anxieties of those near and dear to them. On the other hand, they often show a strange misplacement of emotion, which is sometimes spoken of as emotional incoordination. For example, the patient may say with a silly smile and every appearance of being well pleased with himself that he is the greatest scoundrel in the kingdom; or, on the other hand, while looking the picture of abject misery, he may say that he is in ecstasies of joy. Loss of natural affection is a very common symptom in both acute and chronic cases of insanity, and is one of the saddest features of mental disorder for all concerned.

Mention should also be made of states of **morbid anxiety** and **apprehension.** When the emotional disturbance takes this form, the patient may be weighed down by the fear of some unknown horror, a fear which he cannot express or explain, or by a definite presentiment of evil. His condition is pitiable, and generally he is not only depressed, but restless.

Depression.

A person is said to be morbidly depressed when his unhappiness has no cause, or is quite disproportionate to any cause which can be assigned. Depression may be slight, and akin to the vague feeling of being sad or ill at ease that we all experience at times. But beyond that condition, which can hardly be said to denote ill-health of body or mind, all degrees of depression may exist, down to the most profound melancholy and despair.

Depression is an extremely common and very important symptom among the insane; and it is imperative to remember the intense mental suffering which it causes. If we recall occasions on which we ourselves have experienced a sane and normal kind of unhappiness, perhaps the result of fatigue, indigestion, bad news, or disappointment, and remember that a depressed patient from morning to night and from week to week is in a state of misery infinitely more acute, we may begin to have some dim picture of what life is to him. Depression has been described as a caricature of normal unhappiness, and a distinction has been drawn between two types of it. In the first, the patient is listless, unoccupied, and sometimes apparently semi-stuporose —crushed beneath a weight of apathy and despair. In the second type, there is an element of keen pain, fear, and anxiety; and the sufferer is restless and agitated—weeping, wringing his hands, and striving to express his torture in words. It is not surprising that very many depressed patients contemplate seeking relief by suicide, and that a certain number make suicidal attempts, while some succeed in carrying out their design. This fact adds immensely to the difficulty and responsibility of nursing depressed cases, and more will be said on the subject later. In the meantime, it should be noted that suicidal attempts may occur in many different forms of mental disease, and that they may be the result of sudden impulse or of deliberate plan.

Impulsive Attempted Suicide.—This may occur in unconscious or semi-conscious states, as in alcoholism, stupor, epilepsy, and in temporary conditions in the course of delirium, acute mania, and acute melancholia. The impulse may be conscious, and due to a sudden vivid hallucination or some overpowering obsession. In many depressed cases, the mere presence or even suggestion of the opportunity will give rise to a sudden suicidal impulse.

Suicide may be deliberately attempted in order to escape imaginary danger or disaster. Sometimes it is due to the wish to relieve friends or relatives of financial burdens or some fancied disgrace. More commonly it arises from a desire to escape from bodily or mental suffering. Distress of mind may seem intolerable, and the patient despairs of obtaining relief in this world. Some dreadful delusion may prompt the act, or it may be caused by repeated hallucinations, such as the command of a voice from heaven.

In a few cases, so far as can be ascertained, there is no definite delusion or even depression. Yet the natural desire to live is replaced by a loathing of life.

In considering self-destruction, it should not be forgotten that patients may sometimes put an end to their lives accidentally and unintentionally. They may place themselves in perilous situations without any definite motive, or they may eat yew-leaves, or drink carbolic lotion, or swallow glass, for no particular reason. In institutions some deaths occur which are not suicidal, although directly dependent upon the acts of the patients themselves—*e.g.*, in not a few cases attempts to escape have resulted in fatal accidents.

Exaltation.

As a contrast to depressed states we have states of exaltation which are often found to follow or precede depressed periods, or to alternate with depression. At other times they seem to arise quite independently. In exaltation there is a morbid degree or increase of the natural and normal sense of well-being; everything is bright, and the world is rose coloured. Difficulties vanish, and in extreme cases the slightest incident gives great pleasure, and the patient will say that he was never so happy in his life. Sometimes he feels conscious of unusual fitness, and has a greatly exaggerated opinion of his mental and physical powers. Delusions of grandeur are a natural development of this condition. Intimately associated with exaltation is **excitement,** which ascends by degrees from the mildest elevation of spirits to the wildest outbursts, which tax all the resources of the mental nurse. In addition to the above symptoms, the patient generally shows a certain amount of motor restlessness, with acceleration and flight of ideas. This state also seems the caricature of a perfectly normal condition—namely, that of a person " in splendid form." The patient is expansive, generous,

extravagant, bumptious, self-confident, talkative, and extremely witty—in short, he displays in an exaggerated degree the characteristics of a sane individual who, on some occasion of great rejoicing, or after a certain amount of alcohol, has flung off his usual reserve and self-consciousness, and given full rein to his high spirits and to his flow of ideas. It may be added, however, that some excited patients are not hilarious, but touchy and irritable, or angry, aggressive, and bullying.

Excited patients, like many others, are inclined to be very neglectful of their personal appearance. A nurse must remember that in all probability only a small proportion of those under his care can be relied on to attend properly to their dress and toilet, and that it is part of his duty to think for them in such matters, and to help them to make the best of themselves. A great deal can be done in this way towards maintaining a patient's sense of self-respect, neatness, and decorum.

INSANE HABITS AND PROPENSITIES.

In addition to the more striking signs and symptoms of nervous and mental disorder, of which a short survey has been given, there are a number of habits and eccentricities manifested by the insane which it is difficult to classify under any general heading, but which are familiar to those who work in the wards of any mental hospital. All mental nurses with any experience will be able to call to mind various "little ways" characteristic of different cases, and will know how much trouble can be avoided by making allowances for small and harmless eccentricities, and seeing that a patient is not needlessly interfered with in the performance of some trifling or even absurd act which gives him satisfaction, while it harms no one. For instance, he may have his own particular seat in the ward, and his own particular way of sitting in it; or he may like to be dressed in a certain manner, or to take certain deviations from the normal route when walking. Wise nurses, who are familiar with the various whims of the patients, and know which of them can be safely indulged, can do a great deal to promote the happiness and orderly conduct of those under their care.

Collecting of Rubbish.—Among other minor symptoms is one which merits note on account of its frequency and the trouble it causes—namely, the collecting and hoarding of rubbish of all

descriptions. The amount and variety of utterly useless material which a patient may accumulate, and his ingenuity in finding opportunities for adding to his hoard, are most remarkable.

Degraded and Depraved Habits.

(1) **Dirty and Faulty Habits.**—Such habits are usually due to mental enfeeblement or confusion, and are associated with indifference and utter carelessness on the subject of personal cleanliness and the comfort of others. In cases of recent mental trouble, wetting of the bed is frequently a sign of grave import. It may be the earliest symptom of delirium or confusion, and in any case indifference on such a subject indicates a considerable degree of mental disorder. In mania, the rush of ideas may sometimes prevent the patient from attending to anything in a normal or reasonable manner, and so he does not heed the call of nature.

In a few cases dirty habits are purposive and intended to give trouble. Some of the most difficult cases to deal with are directly dependent upon delusions.

It must never be forgotten that patients may be wet and dirty from physical weakness or bodily disease.

(2) **Self-Mutilation and Other Injurious Habits.**—In a number of different ways insane persons may mutilate themselves without intending to commit suicide. Sometimes the injury may be very serious—*e.g.*, the complete destruction of an eye or removal of some other important organ. Patients occasionally burn or lacerate themselves deliberately, or cut off a finger. Again, all kinds of injurious things may be swallowed. Such conduct may be the outcome of delusions or hallucinations, and it is important for the nurse to ascertain if these are present, and to take such precautions as may be necessary.

Minor degrees of this tendency are very common; biting the fingers, pulling out the hair, and picking the skin are frequent symptoms in severe melancholia.

(3) **Improper Habits.**—Mention may here be made of sexual malpractices, which are to be found in many cases of insanity. Indecent exposure and disgusting habits frequently occur, even in cases in which the person's life and conduct before the attack of mental disorder had been altogether above reproach. It is extremely common for patients to break through the conventions

of society and disregard the decencies of life. All the restraints imposed by civilisation are thrown aside, and the whole conduct becomes offensive and degraded in the extreme. Sometimes, in many cases, the departure from the normal is so great as to raise the question: "How is it possible for anyone respectably brought up so utterly to lose the sense of decency?" To answer that question would often involve an intimate knowledge of the past life of the patient. There is reason to believe that everything which we see and hear is stored by the memory, and that nothing once perceived is entirely lost. Even the contents of a book read long ago, or a casual remark overheard, are never really forgotten. If that be so, there are very few persons who do not accumulate a store of unpleasant experiences, which may suggest bad dreams in sleep, or, in cases of mental derangement, be expressed in offensive speech or behaviour. It must be remembered that among the insane there is frequently no self-restraint. The lower animal nature is no longer held in subjection, the thoughts are uncontrolled, and the ordinary safeguards upon conduct—shame and reticence—are swept away.

WEAK-MINDEDNESS AND ENFEEBLEMENT.

The whole question of weak-mindedness will be dealt with later in this book, but it should be remembered that in almost all forms of insanity there is a tendency towards enfeeblement of mind, and that, in addition to the symptoms of the particular form of insanity from which they may be suffering, a large proportion of patients show increasingly, as their illness continues, signs of simplicity, childishness, stupidity, and dull, mechanical behaviour. A patient who can be easily influenced, put off with a feeble excuse, diverted from his purpose by a word, or amused like a child by a trifle, is often described as **facile.**

REFUSAL OF FOOD.

Refusal of food is a symptom of great practical importance from the nursing point of view. It occurs in many patients in different degrees, varying from a capricious or affected unwillingness to eat, to a determined and persistent refusal to take food at all, or to allow it to be administered in any way. In some cases, a patient to whom food has been forcibly administered will even do his best to reject it and expel it from his body.

The possibility of there being some bodily disease which would account for the disinclination for food must be remembered, such as disorder of the throat, œsophagus, stomach, or intestines, or some other condition interfering with digestion. The patient may not complain of any malady—a point which should be borne in mind—but careful observation by the nurse of his general condition and of all special symptoms may greatly assist the doctor in ascertaining the real state of affairs.

It must also be remembered that in many diseases the power to digest and assimilate food is much lessened, and the patient's diet should be adjusted in accordance with that fact. If he is compelled to swallow the usual amount of the usual kind of food, digestive troubles, with vomiting and diarrhœa, are likely to result.

The refusal of food may be due to a fixed idea that it cannot be properly digested. Some patients take a valetudinarian view of themselves: they have been "martyrs to indigestion" for years, and have gradually so curtailed their diet that at length they habitually take too little nourishment, and their general health suffers greatly.

As a rule, the refusal of food is associated with loss of appetite, but in certain delusional cases the patient absolutely refuses to eat even when he feels very hungry.

In acute maniacal excitement patients may refuse food because of their incapacity to fix their attention upon it, but such a refusal is very rarely persistent, and in all probability a hearty meal may be taken a few minutes later.

In delirious states the patient is generally incapable of eating or drinking. This is due principally to his extreme confusion and disturbance of mind, but partly to the disordered state of his alimentary system, which occasions actual dislike of food.

The most common cause of the refusal of food is the presence of delusions. Sometimes these are related to the patient himself and his circumstances. He may think that it is wrong for him to eat; that he cannot pay for the food, or that it is too good for him, or that he is depriving someone else of it. In other cases, his delusions relate to the food itself. He insists that it is poisoned, or is bad and unfit to eat, or has been tampered with in one way or another. These delusions sometimes arise from hallucinations of taste or smell; or the patient may hear "voices" telling him that he must not take food. In other cases his refusal to eat is deliberate and purposive, and may be due to a desire

to commit suicide. Some patients suffering from stupor may be resistive to the taking or administration of food, but in other cases their refusal of it merely springs from "contrariness" and a general condition of perversity.

In extreme dementia, whether of primary or secondary nature, patients may take no food because of the general deficiency or decay of their mental faculties, which renders them incapable of expressing or attending to their simplest bodily wants. Such patients require constant and careful supervision, as they might die of starvation if not regularly fed by the nurse.

In some cases—and they are not uncommon and require special care and attention—there may be no obvious or definite refusal of food, but at the same time sufficient food is not being taken, or certain parts of their food, such as the fresh vegetables, may be habitually neglected. Such patients, if left to themselves, are likely to suffer much impairment of health.

INSOMNIA.

In concluding the present section, we must mention a symptom which almost invariably occurs, at one time or another, in nervous or mental diseases of any severity, but which may also occur in persons who appear to be in perfect health. This is sleeplessness, or insomnia. As the matter is dealt with in Section XII., it will here be touched upon very briefly.

As regards sleep itself, little is definitely known save that it involves a contraction of the cerebral vessels and certain changes in the nerve cells, which seem to be of a restorative nature. In sleep consciousness does not entirely cease, but it is on a lower and more subdued level, which allows the brain to recover from the fatigue resulting from long-continued activity. If a person is prevented from sleeping for a few days, signs of intense exhaustion of the brain appear which would result in death if the deprivation were continued.

Although it may be true that patients are apt to exaggerate the length of time they have been awake, saying they have heard all the hours strike when the night-nurse reports some hours of uninterrupted slumber, it must always be remembered that any considerable loss of sleep is a serious matter, and means a dangerous interference with the natural processes of repair and restoration.

SECTION XI

SOME NERVOUS AND MENTAL DISORDERS AND THEIR SPECIAL NURSING REQUIREMENTS

In the previous section the signs and symptoms of nervous and mental disorders have been described, and the habits and peculiarities of mental patients have been discussed and explained. It is now necessary to consider these patients from the nursing point of view.

As a rule, our knowledge of mental disorders is not yet sufficient to allow us to label them in a really satisfactory way, as we can label bodily diseases. We must therefore confine ourselves largely to such a description and grouping of the signs and symptoms shown by our cases as will enable us to recognise others presenting the same signs and symptoms, though their cause may be different. Sometimes, indeed, we can speak of definite mental disorders of which the cause, duration, and results are accurately known—for example, general paralysis. But it must be remembered that a patient in the course of an illness may present very varying symptoms, and that from time to time his mental condition may completely change. Moreover, he may exhibit simultaneously more than one of the states which are about to be described.

The important thing for the nurse is the ability to recognise the mental and bodily signs which may exist in a patient at any time. Nurses should possess as intimate an acquaintance as possible with the patient's thoughts, emotions, desires, and impulses, so that he may be first thoroughly understood and then properly treated. In this field of inquiry they have many advantages over the physician, to whom, by observant and careful reports, they can give material assistance in making a diagnosis and in deciding what treatment to adopt.

The reader is referred to the remarks in Section X. (p. 401) on the estimation of the mental condition.

CHOREA.

Chorea (or St. Vitus's dance) is met with in children of school age and in young adults.

The characteristic feature of the disease is the occurrence of irregular, involuntary, sudden, jerky movements, together with muscular weakness. In mild cases there may be only a little twitching when the child is tired, but in severe ones the movements may be so violent and extensive as to throw the patient out of bed.

Mentally, there is fretfulness and irritability, and, owing to the child's attention being centred on the movements, the memory is faulty, and he is unable to do lessons. Occasionally cases of chorea become maniacal.

There is a rare form called **Huntington's Chorea** which affects adults and is hereditary. It is progressive and incurable. On the mental side it starts with apathy and indifference, which is succeeded by a period of depression with excited and impulsive intervals. It terminates in complete dementia.

Management.—The chief duties of the nurse in treating the ordinary chorea of children consist in keeping the patient in quiet, peaceful surroundings. Very acute cases may have to be surrounded by mattresses to prevent self-injury from the violent involuntary movements. Huntington's chorea must be treated according to the prevailing mental condition.

EPILEPSY.

This is a disease in which there are sudden periodic disturbances of the brain functions, and the subjects of it suffer from mental symptoms which often necessitate their being treated in mental hospitals. Most of the cases begin before the age of twenty. It is often found that other members of the family have been subject to epilepsy or some other nervous or mental trouble, and this inherited weakness of the nervous system is the basic cause. The causes alleged by relatives are generally contributory, and among them may be mentioned teething, intestinal worms, scarlet fever, and a fright or fall.

The most prominent symptom is the occurrence of periodic fits,

so that it is necessary to describe the state of the patient (1) during and (2) between these.

In **petit mal** or minor epilepsy there is no convulsion, but a momentary loss of consciousness. The patient does not fall, but may stop in the midst of whatever he was doing, look dazed for a moment, and then resume his conversation, work, or amusement from the point at which he left off. These "sensations," as they are called, are important because they (as well as the major fits) may be followed by **automatic actions** of which the patient is totally or partially unconscious. These actions may be criminal ones, such as indecent exposure or murder. Sometimes they are of great complexity and extend over long periods of time. Thus, persons have been known to leave home and start a new life at some distant place, after a time coming to themselves with no idea where they are or what they have been doing.

Some authorities consider that these actions may take the place of a fit, but it is possible that an unnoticed attack of petit mal has always occurred first.

It is probable that cases of double personality are hysterical.

In **grand mal** or major epilepsy true convulsive fits occur. They are usually preceded by some sensation which serves as a warning and is called an **aura.** Some of the commonest of these are: A feeling of discomfort in the region of the stomach; a tingling in one or more limbs, gradually extending up towards the body; a visual or auditory hallucination. The aura may take the form of some peculiar movement such as whirling round.

The fit may be described as having four stages:

1. The patient gives a loud cry, completely loses consciousness, and falls to the ground.

2. The stage of tonic spasm. The muscles all over the body are rigidly contracted, including those of respiration, so that the face assumes a livid hue. This stage lasts about half a minute and passes into:

3. The stage of clonic spasm. The muscles begin to twitch convulsively. The tongue may be bitten and urine and fæces passed. Respiration is laboured and jerky. This stage lasts about two minutes and is succeeded by:

4. The stage of coma. The muscular twitchings cease, and there is a partial return of consciousness. The patient passes into a state of deep sleep. On awaking, he is usually confused for a varying period. The coma may be replaced, or followed,

by an attack of acute excitement in which the patient is very violent, **epileptic furor.**

It should be noted that the fits may occur only at night, and that the passage of urine in the bed, a bitten tongue, the presence of blood-stained froth on the pillow, or merely a feeling of stiffness and languor, may be the only indications of their occurrence. It is the duty of the nurse, when the fits occur, to report them and to observe if they are associated with any particular incident, such as a meal, a bath, or the period of menstruation. The number of fits varies very much, and frequently both grand and petit mal occur in the same patient. Sometimes major fits succeed each other without intermission, a condition known as **status epilepticus.** In this death from exhaustion may take place. An epileptic may have hysterical fits, and the condition known as hystero-epilepsy has already been referred to.

It is now necessary to consider the mental state of the patient between the fits, and it must be remembered that many who do not have them frequently, show no mental symptoms. Indeed, many celebrated men, such as Julius Cæsar and Napoleon, are credited with having been the subjects of occasional seizures. When the fits are frequent mental deterioration takes place, and if they have commenced in infancy the patient will be imbecile as well as epileptic. The epileptic, as a rule, is irritable, suspicious, jealous, selfish, untruthful, and cruel, although often professing to be very religious, and parading his observance of religious duties. No class of patient is more likely to bring accusations of ill-treatment, and, as epileptics conspire more often than the subjects of other mental disorders, one will often support another in an unfounded charge. A few patients are simple, childish, and tractable, but the majority of these are to be found in special institutions for epileptics. As time goes on, memory fails, and they show signs of dementia, which may be profound. Attacks of excitement, depression, and confusion are sometimes seen, but it must be remembered that the epileptic is as likely to have attacks of mania and melancholia as anyone else.

The management of epilepsy includes that of (A) the fits, and (B) the intervals between them.

(A) As has been stated, the patient usually utters a peculiar cry as he falls. This cry is caused by the sudden tonic contraction of the muscles of the chest and larynx, which drives the air out of the lungs through the vocal cords. When this is heard, an

attempt should be made to catch the patient; otherwise he may fall and injure himself, especially as some patients always fall on their heads. The tongue is sometimes caught between the teeth and bitten. The following are the nurse's duties:

1. Prevent a patient from falling and hurting himself.

2. If the patient can be reached before the clonic stage begins, place something between the teeth to protect the tongue. A piece of india-rubber tubing, or a rolled-up handkerchief or towel, is a suitable article for this purpose. Nothing should be used which can be bitten in two, such as a cork.

3. Loosen the clothing about the neck.

4. Place a pillow under the head and remove him from the neighbourhood of anything against which he may bruise himself when the clonic stage develops.

5. If a fit occurs during a meal, the mouth should be cleared of all food during the tonic stage, for with the return of respiration food may be drawn into the larynx and cause choking.

6. If the fit occurs at night, care must be taken that the patient is not suffocated from lying face downwards on the pillow.

(B) The following are rules for the welfare of epileptics in the intervals between the fits:

By Day.—1. Epileptics usually require to be under constant supervision.

2. Prevent them from climbing ladders or up high places, or standing near open fireplaces.

3. Do not allow them to overfill the mouth with food.

4. Carefully watch the patient, and learn, if possible, any sign or signs which usually forebode a fit in that individual. In many patients the approach of a fit can be predicted by some change in their mental state, often an increasing irritability ending in violence.

5. If a patient is found usually to fall on the face, or the back of his head, a padded turban should be worn to avoid injury.

6. The bowels must be carefully attended to and kept freely open.

7. Nitrogenous foods, such as meat of all kinds, should be given sparingly. Some authorities recommend a diet free from salt.

By Night.—1. The bedstead should be a low one, lest the patient fall off it during a fit.

2. The epileptic should sleep on a hard pillow, or, what is fre-

quently used, a patent pillow stuffed with fibre which permits respiration through it in the event of the patient lying unconscious with his face downwards.

3. He should never be left unattended.

4. False teeth should always be removed at night.

The nurse will have gathered from the foregoing description that epileptics are difficult patients to treat. It must be remembered that, while they do not always tell the truth, they have no memory for periods before and after fits, so that their falsehoods may be unwitting. The good nurse will know from his observations when the patient is becoming "fitty," and by tactfully keeping him apart from the others at these times will ward off quarrels and violence. He should be ever on the alert for the occurrence of the fit itself. The patient should lie down after a fit, so as to allow an opportunity for sleep; this is another useful way of avoiding trouble. While some of the injuries which occur in connection with fits are unavoidable, in a well-managed ward they should be very few.

Jacksonian Epilepsy.—This is the name given to a condition (first described by the neurologist Hughlings Jackson) in which the fits are due to pressure on the motor cortex by tumour, injury to the skull, or other causes. The convulsive movements may be limited to the limb or limbs on the side of the body opposite to that on which the cranial lesion is situated. In the milder cases there is generally no loss of consciousness, but in advanced cases the convulsions may become general, with loss of consciousness.

THE NEUROSES.

Neurasthenia.

Neurasthenia is another term that has been very loosely used. As the name is not associated in the public mind with those mental diseases which often require certification, it has been applied to the early symptoms of all the latter by people who cannot bring themselves to face facts.

The outstanding feature of the disorder is that the patient easily becomes fatigued both as regards body and mind. This condition is the outcome of something either of external or internal origin that has produced a prolonged strain on the nervous system. The former is often easily traceable, as in the case of soldiers who have had prolonged periods of danger and privation,

but the latter may not be apparent at first sight, as in the case of a person who has persistently dwelt upon some worrying idea. The idea may be in the unconscious mind and require special mental treatment to bring it to light. A type of person particularly liable to neurasthenia is the man or woman past middle age who finds the ability to do useful work decreasing and, in consequence, becomes alarmed about the future.

As above mentioned, the most prominent symptom is a feeling of undue exhaustion. The patient becomes tired out over tasks which, in his former state, he would have accomplished without any sense of effort. He has great difficulty in concentrating his attention and applying himself to anything, and even the writing of an ordinary letter becomes almost impossible. He is restless and irritable. A sensation of pressure on the top of the head and an aching down the vertebral column are common. Disorders of the digestive system are frequent, and the patients are likely to become hypochondriacal—that is to say, to pay continuous attention to their bodily organs.

Anxiety Neurosis.

Cases which are now grouped under this heading were formerly classified with neurasthenia. As the name implies, the patient is in a condition of dread and apprehension. He sleeps badly and is subject to dreams of a terrifying nature. It is in the course of this disorder that physical symptoms of mental origin are commonest. These are very varied and may affect any system of organs. Examples are dizziness, "flushings," nausea and diarrhœa, pain and palpitation in the region of the heart, and a feeling of oppression in breathing. In acuter cases the anxiety is more intense, and a sense of impending death or insanity occurs. The patient finds it difficult to collect his thoughts.

The inability to express in an examination something which is in reality quite well known to the candidate is a manifestation of such an anxiety condition. The frequency of the heart's action is increased, profuse sweating occurs, and there is an urgent desire to pass urine or fæces. These physical signs result from disordered balance of the two divisions of the involuntary nervous system. The mental symptoms indicate excessive emotional reactions which do not find outlets in normal ways.

THE PSYCHONEUROSES.

Hysteria.

Hysteria is a definite mental disorder. Many patients have received inappropriate treatment through this not being recognised, the manifestations having been wrongly put down either to mere pretence or to a disease of the nervous system. Authorities differ as to the cause of hysteria. The modern theory is that it is the result of a conflict between primitive instinctive wishes and the influences of education and surroundings (see Psychogenic Causes, p. 375). It used to be thought that females were more liable to hysteria than males, but it is now recognised that males are frequently attacked. Many cases of "shell-shock" in the War of 1914-18 were examples of this disorder.

Hysteria manifests itself in many different forms, and the signs may closely resemble those of diseases of the nervous and other systems. They include exaggeration, diminution, or perversion of sensation, paralysis or contraction of one or more limbs, dumbness, deafness, tremors, and even blindness. Vomiting, retention of urine, and pains in various situations also occur. A pain on the top of the head and a feeling as of something in the throat are frequent symptoms. The patient may have fits which at first sight resemble those of epilepsy, and when the convulsions are well marked (hystero-epilepsy), it is not always easy to distinguish the two, but in the majority of cases differences, as shown in the accompanying table, will be apparent.

	Epilepsy.	*Hysteria.*
Apparent cause	None	Something "upsetting" the patient
Onset	Generally sudden	Often gradual
Scream	At onset	During attack
Convulsion ..	Stages well marked	Stages not so well marked and movements more purposeful
Duration of fit ..	About four minutes	Ten minutes or much more
Biting	Own tongue	Own lips, hands, or other people
Passage of urine	Often	Never
,, fæces	Sometimes	Never
Injuries from fall	Frequent	Rare
Termination ..	In sleep	Often in laughing or crying

The mental characteristics of the hysterical person may exist together with, or independently of, the physical characteristics

mentioned above. The patient is self-centred, emotional, jealous, and liable to take violent likes and dislikes to people for little or no reason. There may be amnesia (loss of memory) for extended periods, which may include important events in the patient's life or episodes in which he has been excited, depressed, or in an abstracted dreamy state. The patient is unduly suggestible—that is to say, apt to receive, to believe, and to act upon, any ideas conveyed to him by word or deed from other persons.

Hypnotism consists in inducing such a suggestible state, so that hysterical patients are, as a rule, easily hypnotised.

Management.—The principal points in treatment that the nurse should bear in mind are, on the one hand, that the patient is not shamming and, on the other, that too much sympathy will be bad for him. A manner that is kindly and at the same time matter-of-fact should be aimed at, and all who come in contact with the patient should let him see that he is considered curable. In severe cases isolation in bed may be ordered with a liberal and nourishing diet. The doctor may employ hypnotism or some other form of mental treatment, and if the nurse remembers the patient's suggestible condition, her influence will assist the doctor's efforts. Attention to the bowels and a watch for retention of urine are things to be borne in mind, but an unduly fussy manner in carrying out such duties is to be avoided.

Obsessional Neurosis.

This class of case includes the sufferers from doubts, obsessions, and fears. As regards the last-named, they differ from the anxiety cases in that there is no impediment to the thought processes, and that the fear is connected with some definite idea, such as that of an open space, a high place, or any small, closed room, such as a railway compartment. These fears are known as **phobias**.

The desire for alcohol or drugs at periodic intervals is the main symptom of another variety of this disorder; while a third is manifested in those persons who are subject to recurrent impulses towards purposeless thefts or setting fire to things. The compulsion felt to tread on all the cracks in the pavement or to avoid so doing is a milder variety of such an obsession which is common in children and may occur in adults.

The state of doubt may concern some ordinary matter, such as whether or not the gas has been turned out, or may involve

important questions, such as the truth of religious convictions. In either case the mind is not satisfied by investigation or explanation, and the difficulty recurs. If not treated these conditions are progressive, and a subject who has been originally merely precise and methodical may eventually become the slave of his own system.

Management.—If possible the patient should be removed from the exciting cause of his malady. Rest and good feeding are of importance, and the chief way in which the nurse can be of assistance is by awaking new interests in the patient's mind and, by encouragement, helping him towards the re-establishment of self-confidence.

The mental disorders briefly described under the headings of the neuroses and the psychoneuroses are not sharply marked off from one another, and cases present themselves exhibiting in all degrees of severity symptoms from two or more of the subgroups. For this reason authorities still differ in their classification and nomenclature. In the neuroses the cause is a physical one, and removal of the cause relieves the symptoms. In the psychoneuroses the predisposing cause is a mental one, and is often traced by psycho-analysis to some experience of early childhood. In both groups exciting causes from the stresses of life, such as financial or domestic worry, are usually present.

These maladies are common amongst all classes in all civilised races, and he is a fortunate worker who has not at some time or another laboured under a distressing sense of mental and bodily fatigue, vague and oppressing anxieties, morbid preoccupation with the state of his health, and foolish and annoying obsessions. In the more severe instances the mental suffering is intense, and these are amongst the most difficult cases that a physician is called upon to treat, but unless conduct is seriously disordered, treatment in a mental hospital is unnecessary.

STATES OF DEPRESSION.

Mere depression of spirits does not constitute a mental disease. It can only be so regarded when it exists to a degree which is quite out of proportion to the circumstances and surroundings of the patient, or when it affects his conduct, as, for example, when it

causes him to neglect his business and live a solitary life, to lose interest in his family or his own personal wants, or to contemplate suicide. There are several forms of mental disease in which depressed states occur, but in a very large class of cases depression is the most obvious and important symptom, and the patient is said to be suffering from melancholia.

Melancholia.—The depression of a melancholic patient is evident at once—in his appearance, attitude, and expression of misery, his furrowed brow, and drooping mouth. His feeling of ill-being is generally intense and all-absorbing, and prevents him from taking an interest in his surroundings. His thoughts are self-centred and he is often most selfish, even while professing himself unworthy of any consideration whatever. His conduct is generally rational, save when prompted by delusions; and orders are obeyed without argument, although without interest or energy. Some patients are fussy and irritable, and insist on pouring out their woes to anyone who will listen. There is rarely any trace of incoherence. The emotions as a rule are only stirred in respect of the patient's own condition. The power of connected thought is diminished, and any mental effort involves a great exertion, resulting in fatigue and uneasy feelings in the head, such as buzzing or throbbings, and increases headache if that is present. Melancholics are generally modest, dignified, and well-behaved.

In the most common and typical states of depression delusions are prominent, and these are always of an unpleasant nature. The patient is a sinner—ignored, reviled, and hated, but always justly so in his own view, because of his unworthiness. His thoughts dwell upon some idea of impending retribution, social or religious, and he believes that a slight, perhaps imaginary, error of conduct will be followed by a punishment altogether out of proportion to the offence. Auditory hallucinations are an unfavourable symptom. They are not usual in acute recoverable cases, but are generally prominent in chronic cases.

Next to these come delusions of poverty. Visceral delusions are also very common, such as that there is no passage through the bowels, or no stomach. These are often based on illusions, since constipation or some actual disease may have given rise to the idea. Delusions strongly influence the conduct in melancholia, and lead, for example, to the refusal of food. The suicidal impulse is very strong in melancholics; even if a patient thinks he is

eternally damned, he may try to take his life in order to escape from present ills. A homicidal tendency is sometimes exhibited towards near and dear relatives, the impulse being to save them from future misery or some impending danger.

It has been stated elsewhere that delusions are false beliefs, of whose falsehood it is impossible to convince the person holding them. Speaking generally, this is true, and it is useless to argue with delusional patients. Yet there are some melancholics whose delusions can be modified and even banished, not so much by argument as by the repeated assertion that they are untrue. Sometimes a little good-humoured banter, an appeal to the patient's feelings, or some other mode of suggestion in his waking hours may be employed with advantage. Every effort, of course, should be made to divert his mind and arouse other interests. Most melancholics have a fairly complete use of their reasoning faculties, and if reiterated assaults on different lines are made upon their false beliefs, these may finally be recognised for what they are and abandoned. Such suggestions not only appeal to the patient's intelligent consciousness, but affect beneficially his subconscious mental life.

Again, in most melancholics a time arrives when the disturbance in the patient's brain passes its climax and begins to lessen. His mind becomes more open to suggestions as to the final disappearance of his foolish notions and his complete recovery. Tact, and a sympathetic understanding of his temperament, will decide the form these suggestions should take and the fitting times at which to make them. Each patient needs individual study, and only the nurse who devotes thought, energy, and goodwill to this question will effect really satisfactory cures.

To return to the general subject of depression, the bodily condition may not be much affected in slight cases, but as a rule there is loss of flesh with gastric disturbance. The tongue becomes furred, the breath foul, constipation is nearly always present. So important is the digestive disturbance that some ascribe melancholia to the bacterial products absorbed from the intestine into the blood. With the general malnutrition subcutaneous fat is lost, the muscles become flabby and toneless, and the pulse is small and feeble; the skin is pale, muddy, and sallow, anæmia is more or less marked, and in women the menstrual function is disturbed and frequently suppressed. Sleep is light and fitful, with bad dreams, or insomnia may be persistent, and

the patient may be silent and watchful for hours, although appearing to be asleep. The temperature is generally subnormal, but may be raised by the constitutional disturbance of constipation or other gastro-intestinal derangements.

States of depression vary greatly, and only a few symptoms may appear in any one case, but they are all fashioned on the same lines.

Although not sharply divided from each other, three types of cases may be mentioned.

(1) **Simple Melancholia.**—A state of depression without definite delusions, in which the patient is sad and miserable to a degree altogether out of proportion to any cause that may exist. Such cases may be actively suicidal.

(2) **Acute Melancholia.**—The symptoms already described are present in a more marked degree, and are often accompanied by extreme restlessness. When this is a prominent feature the case is known as one of **agitated melancholia.** The patient is constantly on the move, walking aimlessly about and wringing the hands. It is noticeable that the movements take place at the smaller distal joints, such as the fingers, wrists, and ankles, while there are rigidity and restraint at the larger proximal joints, such as the shoulders and hips. The patient utters groans and exclamations indicative of distress, repeating "Oh! How terrible! Isn't it dreadful?" or similar phrases. In some the restlessness takes the form of picking at the skin, and they may in this way inflict sores upon themselves or rub their hair away in patches. They feel sure that something dreadful is going to happen (what it is they cannot say). In other cases of acute melancholia, delusions influence the conduct of the patient so much that some authorities have classified them under the separate heading of **delusional melancholia.**

In nearly all cases of acute melancholia refusal of food and sleeplessness occur, and, in consequence, there is loss of weight and sometimes even death from exhaustion, although complete recovery may always be hoped for and often obtained. Cases which terminate in neither of these ways become either demented or chronic melancholics.

(3) **Chronic Melancholia.**—In this condition the symptoms persist, but in a milder form. The aspect of the patient is still depressed, but is no longer a safe guide to the underlying mental state. His expression has become fixedly miserable through habit,

but there is not the degree of mental pain experienced in the acute stage. His physical condition improves, he puts on weight, and sleeps better. If this bodily improvement is not accompanied by a corresponding mental one, the outlook as regards recovery is bad. Nevertheless, unexpected recoveries do take place after the lapse of many years. On the other hand, some patients retain their delusions, hallucinations, and suicidal tendencies, and require constant vigilance for a very prolonged period.

The special nursing requirements of melancholia are as follows: Rest in bed in quiet surroundings is important in acute cases, and if it can be arranged for this to take place in the open air so much the better. Patients are then in circumstances which require the minimum of mental effort; and an opportunity is afforded of giving them complete bodily and mental relaxation, and counteracting the well-meant but ill-advised efforts of relatives who have tried to " rouse " or " distract " them and thus added to their worries. Moreover, such patients are often in a very debilitated condition, and need rest on physical grounds as well.

It must be remembered, however, that this treatment may defeat its own end. If a patient is very restless in bed, the nurse should note whether the restraint required to keep him there, and the exhaustion resulting from his vain endeavours to be up and about, are not doing him more harm than comparative freedom out of bed. Nurses can give much help by reporting to the doctor their conclusions on this point. Again, should prolonged rest be secured, nurses should note the stage at which the patient's health is sufficiently restored to make some exercise not only possible, but desirable. The results of such exercise should then be watched, that its quantity may be lessened if there is any sign of exhaustion.

Particular attention must be given to the whole alimentary system of the patient. Every effort must be made to prevent or remedy the constipation which is such a common feature in such cases. Liberal feeding is required, with abundance of milk and green vegetables, and, indeed, any easily digested and nutritious food, and this will often have to be undertaken in the face of his indifference or even active opposition. On the other hand, care must be taken not to overfeed, and signs of indigestion call for a light and peptonised diet. The doctor is guided to a large extent in his treatment by the patient's weight, of which careful record must be kept. It is far easier to deal with patients who

absolutely refuse food than with those who take an insufficient quantity. When a nurse has induced one of the latter to take an inadequate amount, he is apt to cease his efforts, thinking that his charge has had enough to go on with. The result of this policy is simply very slow starvation, which is only noticed when a gradual steady loss of weight is recorded. Sometimes one nurse can persuade a patient to take food when another has failed. In one hospital, whenever food was refused persistently, the cook was summoned, and she almost invariably succeeded in coaxing the patient to eat, even when the efforts of all the doctors and nurses had been futile. Such a "knack" is worth cultivating, since food taken voluntarily does far more good than food poured into the stomach through a tube. It is well to keep a record in the form of a chart or table of the amount actually consumed by the patient.

Most important of all is the question of suicidal tendency. Probably every melancholic patient has, at one time or another, ideas of suicide and, with many, it is their sole and dominating interest. A fuller discussion of the duties of a nurse in this connection will be found in Section I., but it must be stated here that the only safe rule to adopt with regard to melancholic patients is to keep them *constantly* under the observation of some responsible person, in the absence of a definite statement from those in authority that this is unnecessary. The patient who succeeds in committing suicide is not so often the one with known suicidal tendencies, as the one who is apparently recovering from melancholia and "getting on nicely," and in whose case the above precaution has been prematurely relaxed. It is probable that the importance of this matter is never realised fully by a nurse or attendant until its neglect has been the cause of some serious accident. The reader is advised to turn to the remarks on this subject in Section I., and to remember while reading them that, far from being an unnecessary piece of fussiness, they are the outcome of long and sometimes bitter experience.

The outlook as regards recovery in melancholia is consistently good, and no matter how long an attack may last one is never justified in giving up hope. Besides the conditions mentioned above, states of depression are sometimes found in the course of general paralysis, in mental diseases connected with alcohol, epilepsy, old age, brain injury, childbirth, and also in dementia præcox, the psychoneuroses and the neuroses. As we shall see later, they sometimes alternate with states of excitement.

STATES OF EXCITEMENT AND EXALTATION.

Excitement and exaltation are often found together, but may occur separately, and it is important not to confound the two. A patient may be excited without showing any undue elation and cheerfulness, as is seen in some confusional cases. On the other hand, a patient may be exalted, and yet remain quietly chuckling to himself in a corner, as in some cases of general paralysis. As we have seen in agitated melancholia, excitement may be combined with depression.

In cases of mania, which we have to consider next, excitement and exaltation are both found, and the symptoms vary in severity, from the mildest elevation of spirits to an activity which will tax all the resources of the nurse.

Mania, like melancholia, is classified as simple, acute, and chronic.

Simple Mania.—The chief feature seen in this mild form of mania is loss of self-control. The general appearance and attitude may be normal, but more often there is a restlessness of manner, an increase in the play of facial expression, and an inability to pursue the same theme of conversation or routine of conduct for more than a very few minutes at a time. As regards isolated acts, the conduct is normal, but shows a want of balance. Thus a woman began vigorously to clean her front steps half an hour after her wedding. No doubt they were dirty and required it, but her relatives considered the choice of occasion inappropriate. Again, a clergyman, after a period of depression caused by the death of his wife, to whom he was deeply attached, commenced to write amorous postcards to servant-girls, although able to conduct the church services normally. In simple mania, patients are apt to be very talkative, but without incoherence. The emotional state is exalted, there is a feeling of pleasurable excitement, and smiles or merry laughter are aroused by insignificant causes. "Why shouldn't I laugh if I feel happy?" the patient will ask. The emotions assume an undue prominence from want of self-control; exaggerated love, charity, or a tendency to quarrel, are seen. Such patients are often officiously anxious to assist the ward nurses, but their misplaced enthusiasm may be an actual hindrance. Attention is impaired, and there is an urgent desire to get on to the next subject; thoughts crowd upon one another,

and wonderful plans are formed so fast that there is not time to digest them.

Memory is normal; there are no delusions, hallucinations, or obsessions. Any impulses present are mild and comparatively harmless.

This condition is not unlike that which is present in the early and benevolent stage of drunkenness from alcohol, and possibly the absorption of some kind of poison or toxin, reacting on a predisposed brain, may be its explanation.

Acute Mania.—Here mental and motor excitement are the principal features. The patient is restless, quite unable to keep still, perhaps arguing or fighting when interfered with. His conduct is unreasonable and devoid of self-restraint. He will often, if allowed, rush about naked, talking loudly the whole time; his excitement concentrates on some line of thought or action, but this line changes every few seconds, so that the results are illogical and inconsequent. Sometimes the bystander can follow the train of ideas, but more frequently it is too rapid. The patient is generally degraded in habits, and has no regard for social convention or decency. His attention easily wanders; it can generally be attracted momentarily, but not retained. Judgment and inhibition are gone, and are replaced by all sorts of impulsive outbursts. These are never reasoned or tenaciously pursued, but are apparently aimless and frequently destructive, such as breaking a window or tearing up clothing. The delusions that exist tend towards the exalted type and are never fixed, but are characterised by restless, busy change. Hallucinations, if present, are usually transient; they may not be noted at the time, but only on the examination of impressions after recovery. Those of sight and hearing are the commonest, but the senses of smell, taste, and touch may also be involved.

The bodily health suffers to a certain extent, but not very seriously. Sleeplessness is present, but not constant; and a few hours of sleep three or four nights a week, or a whole night occasionally, may be sufficient to keep the patient going. The temperature is normal or raised a degree. As a rule, food is taken freely but capriciously. Dyspepsia and constipation are commonly present. Such a condition may persist for weeks or even months without causing death or prejudicing recovery.

The severity of the symptoms is greater than in simple mania,

but the state of the patient is not so serious as that described later under delirium.

Chronic Mania.—When an acutely maniacal patient begins to sleep well at night and eat heartily by day, when improvement of the physical state occurs without any mental amelioration, while the conduct remains on the same low level, then it is to be feared that chronic mania is developing. This suspicion is not always correct, but it is a safe general assumption. Patients suffering from chronic mania are excited, either spasmodically or continuously, and, generally speaking, are noisy, abusive, and apt to be violent. Delusions are usually present and tend to become fixed. Auditory hallucinations also may be present, whilst visual ones are comparatively uncommon. The personal habits vary with the grade of degeneration—sometimes they are filthy, sometimes unexceptionable. The amount of excitement also varies within wide limits in different cases, or at different times in the same case. The bodily condition is not affected. There is always a certain amount of weak-mindedness combined with chronic mania. Some cases remain unchanged for years; other patients slowly sink into dementia, and become harmless, and often good workers. Whether such individuals are to be classed as chronic maniacs or dements is a question which must be settled in each case independently, according to the prevailing characteristics.

The remarks as to treatment in bed in the open air apply to cases of acute mania as well as to those of acute melancholia. It is often difficult to get the patient to remain in bed, but efforts to do so should be persistent. The prolonged hot bath is another useful mode of treatment, and patients who will not stay in bed will often remain quietly in the bath. This treatment is not suitable for aged patients, nor for those suffering from heart and lung troubles. Sometimes a pack may be ordered instead of the bath.

Tact and a ready wit are most valuable qualities in nursing a case of mania. It is wonderful how much noise and trouble can be avoided by a nurse who is able to take advantage of the fact that the attention of a maniacal patient can be distracted with comparative ease from one thing to another. An irritable, abusive, turbulent patient who annoys everyone in his neighbourhood may often have his mood turned, temporarily at least, into one of cheery though boisterous good-fellowship by an

adroit remark. A very practical illustration of this occurs in the feeding of a maniacal patient. Very often the manner in which his food is handed to him, or the remark made by the nurse when doing so, determines whether he will fling it on the floor in a rage, or gobble it up with enthusiasm. Few patients can be more irritating than the sufferer from mild simple mania, who is frequently an officious busy-body, fault-finding, overbearing, and intent upon managing the affairs and interfering in the concerns of everybody he meets. There is immense scope for tact and resource in striving to make the best use of such an individual's erratic energies, but the task is a very hard and frequently a very disappointing one. When the excitement is subsiding and convalescence approaching, the nurse should supervise the exercise and occupations of the patient. Graduation and moderation must be the keynotes, for recovery will be retarded if he is allowed to do too much.

It has been remarked above that some cases become chronic and reveal a certain amount of weak-mindedness, but many authorities doubt whether such cases are pure mania, and are inclined to the view that some other form of insanity is present which has helped to maintain the excitement and to bring about the gradual dementia. States of excitement are met with—for example, in general paralysis, dementia præcox, mental disorders associated with childbirth, alcohol, epilepsy, and old age, and also in the alternating states described on p. 445.

RECURRENT STATES.

A discouraging feature of work in mental hospitals is the number of patients who suffer from repeated attacks of insanity, with longer or shorter intervals of good health between them. After months of careful nursing a patient recovers, goes home, and remains well for a time, then relapses, and is readmitted as ill as ever. These recurrences are usually attributed to some illness or accident or to special adverse circumstances, but most commonly they denote a constitutional instability of mind, and cannot be averted. This tendency to recurrence is found in a considerable number of states, which we shall discuss later, but it is most frequently and strikingly seen in mania and melancholia. In some cases the attacks are repeated at such frequent intervals that the condition has been named **recurrent**

mania or **recurrent melancholia.** As a rule, the later attacks closely resemble the earlier ones, the same ideas arise, the same accusations are repeated, and the same insane habits and actions tend to reappear.

ALTERNATING STATES—MANIC-DEPRESSIVE PSYCHOSIS.

Mania and melancholia frequently occur at different times in the same individual, and those who have much experience may remember several cases who were discharged well after an attack of melancholia, but returned some months later in a state of mania. One patient had six attacks of acute mania, from each of which he apparently made a complete recovery, and was discharged. When he became ill for the seventh time his condition was one of acute depression. A lady who had been maniacal on several occasions had three successive attacks of depression and then one of mania. In some cases the attacks alternate between the two states in this irregular way, but in many others a definite cycle is developed, in which excitement, depression, and apparent perfect health follow each other with extreme regularity. This condition has been called **circular insanity** or **folie circulaire,** but it is now more usual to describe any case in which both mania and melancholia have occurred as one of **manic-depressive insanity.** *Many authorities believe that all cases of mania and melancholia are, in reality, cases of manic-depressive insanity,* and that if they were closely observed, the alternations of excitement and depression would be evident, although one of these is generally out of proportion to the other in intensity and duration. In the case, for example, of the patient who apparently had six successive attacks of mania, it might have been that for a day, or even a few hours after the excitement subsided, he was in a very slight and transient state of depression. Certainly very many cases of melancholia, if their history is carefully investigated, seem previously to have been in a condition of mania which was so slight and so brief that it was overlooked or accepted as evidence of robust health. A lady who is now a melancholic remembered no previous illness except one attack of depression ten years before. But on inquiry from her relatives it was found that four or five years ago, although normally a quiet and retiring person, she became the life and soul of the district in which she lived, joined societies, took the chair

at meetings, arranged concerts and sales of work, made speeches and, in short, behaved in a way which was typical of very mild simple mania, although all her friends noticed was the completeness of her recovery from the depression.

Once the tendency to recur or alternate is thoroughly established, the outlook is not good as regards permanent recovery, although it is always hard to say at what interval the attacks will occur. Very often the interval of health tends to be shorter as time goes on. In typical cases the patient does not become in any way enfeebled, and, on recovery from an attack, may show unimpaired mental health and vigour until the next attack takes place. Such patients may live to a great age, and even at ninety years cycles of mental disturbance have been distinctly recognisable.

There is one practical point in nursing which is particularly applicable to manic-depressive cases. Depressed patients are so pathetically miserable, and yet so dignified, sensitive, and orderly, that in giving them the sympathy which they may rightly claim an inexperienced nurse is apt to talk of his own private affairs, and to bestow confidence in the hope of interesting and comforting his charge. But it must be remembered that should the patient pass into a state of mania, as he may do at any moment, any private or personal matter confided to him will most certainly be made public, possibly in a very loud voice with the addition of a good deal of imaginary detail. Many a nurse has regretted thus "giving himself away," and the above warning simply illustrates the general rule that while we must do our utmost to interest and help our patients, we must not tell them anything which we should object to their proclaiming from the house-tops.

VIOLENCE.

The nurse will probably find early in the course of his work that it is difficult to lay down definite rules as to the precise method of dealing with violent patients.

Violence may occur in such infinitely various forms that probably few people take the trouble to consider the whole question clearly. Still, there are points which every nurse should bear in mind. One is that the presence of bruises or other signs of injury on a patient is, in itself, a suspicious circumstance which is discreditable to those in charge of him, and must always be

reported to the medical officer, whose duty it is to make impartial inquiry into their cause. The nurse, therefore, must be prepared to give a satisfactory account of how they were sustained. If it happened during an attack of violence, he is expected to show that his handling of the patient was not needlessly rough or dangerous. Thus, it is all to his advantage if he can face such emergencies with intelligence and skill.

Attacks of violence may be divided roughly into two classes. The milder forms, which occur almost daily in nearly every mental hospital, may be due to delusions, hallucinations, morbid irritability, or to the many little causes of friction which arise when a number of people are together for the greater part of the day and every day.

The other forms are much more dangerous. In these, patients are not only excited and turbulent, but actively homicidal. Such cases are not common, but every mental hospital contains accounts of murderous, and sometimes fatal, assaults on doctors, nurses, or other members of the staff, and even on visitors. There is also a danger that an outburst of mere excitement, if dealt with injudiciously or roughly by a nurse, may pass into a furious desire to hurt or kill. For the nurse's own sake it is of the utmost importance that he should have his wits about him and be able to put in practice any knowledge or experience he may possess.

Though detailed rules are impossible, some general advice may be given with regard to the treatment of violence in the above forms. This may be divided into two parts, the first dealing with preventive measures, the second with the attack itself. In each connection both types of violence will be considered.

Preventive Measures.

(*a*) **Conditions Relating to the Patient.**—An observant nurse may often be warned by some physical or mental symptom in a patient of an impending attack of excitement, and may succeed in averting it. Such signs are especially to be noticed in epileptics, chronic delusional, and chronic maniacal patients. Constipation often tends to produce irritability and excitement, and should be treated before those moods develop. Bodily disease of various kinds, especially in its more severe phases, has a similar effect, and should receive every attention.

Warnings of dangerous violence may be found in some epileptics and also in delusional and chronic excited cases. Such signs are

increased irritability, suspicion, or sullenness, threats against particular individuals, the secretion of anything that can be used as a weapon, or the hearing of voices which suggest delusions of persecution. These symptoms should be promptly reported, and the nurse should never, if possible, be left alone with such a patient.

(*b*) **Conditions Relating to the Patient's Surroundings.**—These may contribute to a patient's excitement or help to bring about a severe attack of violence. Overcrowding is one harmful condition. Plenty of room for each patient lessens the opportunities of friction, and though this matter is seldom under the nurse's control, he should be prepared to suggest any requisite change to the medical officer. Wards containing only a moderate number of patients are undoubtedly a great advantage. A real though temporary breathing-space may be secured for a patient who is suffering from, or threatened by, an outbreak of excitement by removing him to a quiet room, either with a nurse or alone. If he is alone in the room the door must be left open, as to shut it would involve "seclusion," which must only be resorted to by the doctor's orders. This plan sometimes has an excellent effect in calming irritation and subduing any tendency to violence, and if the nurse is tactful a quiet talk with the patient may also be of great service.

Of course, there are risks attached to this method. The nurse may be tempted to have recourse to it whenever a patient is at all troublesome. Again, the patient may look upon such isolation as a punishment unless the reasons for it are carefully explained. In any case, this treatment should not be prolonged after he has calmed down, nor should it become a habit to resort to it.

Should it be necessary actually to seclude a patient, the nurse must see that he is under observation, and the length of time the seclusion lasts should be reported each day.

Another contributory cause of excitement is needless interference with a patient by some other patient, or possibly by the nurse. The latter grievance will cease as the nurse gains experience, but the former cannot be altogether avoided. Yet the situation may often be relieved by placing two patients who annoy or antagonise each other in different wards. Sometimes antagonism to a particular nurse may be dealt with on similar lines. This is comparatively easy if there is no overcrowding.

Occasionally it is possible to go further, and provide a complete

change of environment. Many cases benefit much by removal to another hospital. A patient who has a bad reputation for violent conduct in one institution may be quite exemplary in another. He finds fresh nurses, with no tradition as to his character and conduct, and fresh interests, while, being a new-comer, he naturally receives a good deal of attention. All these factors help to make him quieter and more normal. Such a change of surroundings is possible for all private patients if the consent of their friends is obtained, but it cannot be secured by rate-paid patients, though, with thought and good-will, it should not be very difficult to make similar arrangements for them.

Dealing with Attacks of Violence.

(*a*) **Slight Attacks.**—In slight attacks of excitement coupled with symptoms of violence the mere presence of several nurses is often sufficient to calm the patient, who sees that any attempt to struggle would be futile. But other methods may be employed, and it is astonishing what tact will do. A joke that suddenly appeals to the patient's sense of humour, or some other diversion of his interest, may cause the clouds to dissipate before the storm can break.

To take an illustration, a new patient arrived one evening at a mental hospital in a state of restless, resistive excitement. When put to bed, it was found almost impossible to keep him there, and the nurse who was on duty during the first part of the night yielded his post to another with the report that his charge was extremely "obstreperous." The new nurse, by two or three tactful questions, found that the patient was a fisherman, and in a few minutes the two were engaged in preparing an imaginary line, baiting an imaginary hook, rowing out in their boat, and returning to shore with a fine load of imaginary fish! By the time this enterprise had been carried through, the patient was healthily worn out and was glad to settle down to sleep.

On another occasion the same nurse managed a noisy, restless case of delirium tremens for several hours in the night, by requesting him to bring a long succession of imaginary drinks, paying him most carefully in imaginary coin, and receiving imaginary change. Thus a safe channel was provided for troublesome, if not dangerous, energy and excitement.

During the day, a brisk walk round the grounds in charge of two nurses may be found efficacious as a means of inducing quietness.

This removes the sources of friction, provides fresh objects of interest, and gives a healthy outlet to the patient's muscular energy.

Continuous warm baths may be used in some cases of acute restlessness which are on the border-line of violence. These should be given only by medical order, and the patient should be under constant supervision while in the bath. The patient's appearance should be closely observed, and if there is any sign of faintness he must be taken out of the bath and a stimulant must be given. It is well to have this ready in the bathroom in case of emergency. The method of giving the bath is described in Section V., p. 212.

Some very restless patients are so weak that they have to be kept in bed, and sometimes this is not easy. Still, attempts to get out of bed can generally be prevented without using much force, and as a rule one nurse is sufficient to manage such a case. The movements of the arms need not be entirely restrained; it may be enough to guide them by holding the hands or wrists lightly. If at times some pressure is inevitable, it should be applied at the shoulders or hips. Complete restraint soon becomes very exasperating, and if it is necessary for a long time, the medical officer should be informed in order that some other method may be devised.

Finally, the forms of treatment mentioned above, as preventing violence, may be of great use in dealing with the milder forms of actual violence. But there are cases beyond their reach, and the nurse must know how to deal with them.

(*b*) **Attacks of Dangerous Violence.**—In every hospital attacks of violence occur which can neither be averted nor subdued by any ordinary means, and in which recourse must be had to some method of forcible restraint. Such restraint may be manual, chemical, or mechanical.

(1) **Manual Restraint.**—When an attack of violence is quite unexpected, physical force may at first be the only possible mode of dealing with it. But there are grave drawbacks to its use. The chief one is that it may create in the patient a feeling of resentment towards the nurse who has to exercise it, and a desire " to turn the tables on him " on a future occasion. The confidential relation between nurse and patient is disturbed, and the chances of recovery are lessened. Hence, manual restraint should only be resorted to when its use is quite inevitable. It is a dangerous weapon which is liable to injure either

nurse or patient, and which, if carelessly employed, may result in serious disaster, and even in death. At the least, it may easily cause bruises which would be regarded by the patient's relatives as evidence of cruel treatment—a view which the patient himself would do his best to encourage.

The only safe rule is, first, to be sure that force is really necessary, and then to have sufficient help at hand to make the restraint effective without being dangerous. Pressure must not be applied to any important organs, such as those in the abdomen, or to bones like the ribs, liable to be easily fractured; nor must it interfere with breathing. Again, pressure should not be used in such a way that long bones, like those of the arm or leg, incur risk of being broken against some hard, unyielding object, such as a chair or table, or even the body of the nurse or patient, if they are exerting all their strength in different directions.

Another point to remember is that the muscles which straighten a limb—extensors—are stronger than those which bend it—flexors. In controlling a violent patient, then, the nurse should endeavour to get him into a position in which his more powerful muscles cannot be brought into play. This will be best accomplished by laying him flat on the floor or on a bed, and keeping him there with a nurse attending to each limb. One nurse grasps the patient's wrist or shirt-sleeve, keeps the arm extended near the side, and with the other hand on the point of the shoulder, keeps the patient on the bed or floor while a second nurse adopts the same method with the other arm. The legs are grasped by the ankles, and also held down over the knees. When the patient is in that position it does not require excessive force to restrain him, and the next thing to do is to take off his boots. If violent struggling occurs, one nurse may temporarily have to alter his hold on a limb, lest the patient should get it into a position in which it might be fractured. Usually such restraint is only necessary for a short time. If a patient quiets down it may be gradually lessened, especially if he pledges himself to good conduct. It will be necessary, however, to keep a watchful eye on him for a while, as such a pledge might possibly have been given only with the idea of making a fresh attack at the next favourable opportunity.

If a nurse is attacked when alone, and the assailant has no dangerous weapon, the best way—if he kicks—is to lay hold of

his foot. If this is not feasible, he should be grasped round the waist, partly lifted from the floor, and then, as gently as possible, laid on his back. The nearer the nurse gets to him the less power has the patient to strike with his fists.

If he has a weapon, the nurse can often strike it from his hand with a rug or mat. If this method succeeds, the weapon should be secured, if possible, and flung out of the window. A chair may sometimes be used as a means of protection, and a rolled-up mat, or even a pillow, which is too soft to inflict an injury, may ward off a patient who has "murder in his eye" till a chance of seizing him round the waist presents itself or help arrives.

If the patient grasps the nurse's hair, the nurse should keep as near the patient as possible, and loosen his grip by bending his wrist. It is impossible to give directions for all conceivable emergencies. Of course, it is understood that a nurse, if attacked when alone on duty, should at the first sign of danger blow a whistle, ring a bell, or do whatever is in his power to summon prompt assistance. There is no glory whatever in tackling a violent patient single-handed if help is available.

When a patient who is violent has to be taken for a walk, the right arm of one nurse should be put round the patient's back, grasping the patient's left hand in front. Similarly, the other nurse should put his left arm round the patient's back from the other side grasping his right hand in front. Thus, he cannot fall, no dangerous pressure is exerted, and each nurse has one hand free. The only possibilities to guard against are that he may butt with his head at a nurse's face, or knock the latter's legs from under him by putting his own foot behind them.

(2) **Chemical Restraint.**—There are certain drugs which act as nervous or muscular sedatives, such as bromides, opium or morphia, paraldehyde, sulphonal, chloral, hyoscine, and a number of others. The nurse must never administer these save by medical order, but, when excitement or violence is long-continued or really dangerous, they may be of the greatest value. In a case of delirium tremens, for example, where there is extreme restless excitement with torturing hallucinations, the patient may obtain a good night's rest through a sedative and wake up clear in mind. The greater the violence the stronger the sedative needed, and a powerful dose may tide over a period of great risk. When rapid action is necessary, the hypodermic syringe is generally used.

Sedatives should, however, be administered as sparingly as possible. In the first place, prolonged use of them probably damages the nerve cells; in the second place, it may induce a drug habit which is extremely harmful and very difficult to break. The nurse should never ask that a sedative may be prescribed merely to save himself trouble.

(3) **Mechanical Restraint.**—Sometimes both manual and chemical restraint are of comparatively little service. This may be the case with epileptics who are seized with homicidal furor; with a few delusional patients; with some patients who are intensely suicidal, and whose efforts to end their lives take the form of self-mutilation; and with some surgical cases.

Now and then, it may be necessary to control the actions of such patients by mechanical restraint. This term signifies the restriction of the bodily movements of a patient by any appliance whatever, such as a sheet, bandage, towel, strait-waistcoat, strap or pack. Such restraint, of course, must never be applied except under medical order, which specifies both its nature and duration. If continued for more than a short time, the patient should be released from it every hour or so, and care should be taken to prevent any chafing of the skin. Any use of mechanical restraint must be reported to the Board of Control. It is a method which, as a rule, irritates and excites the patient, and should only be adopted as the last resort—unless, indeed, a patient actually requests it. An instance of this may perhaps be given, though it is not concerned with violence. A patient suffering from boils found that he could not resist the temptation to scratch them, and consequently the infection was being spread all over his body. He pleaded to be put in a strait-waistcoat, and this was done, with the result that the boils rapidly disappeared!

STATES OF DELIRIUM.

A patient suffering from **acute delirium** (sometimes called **acute delirious mania**) is obviously ill. His face is pinched and worn, sordes usually form on the lips, the tongue is thickly furred, the pulse is rapid, and the temperature rises to 100° F. or more. If asked a question, he is unable to respond, and he can only pay attention for an instant. He talks continuously in an incoherent way, with little or no reference to what is said to him. There is no consecutive thought.

Hallucinations both of sight and hearing are present, but they are fleeting, and illusions are also common; the patterns on wall-paper become grotesque faces, the light of a lamp visions of angels. In the early stages there is much excitement, with gesticulation and frenzied impulses of all kinds; later, as the strength fails, the patient lies in bed exhausted, constantly muttering to himself. The pulse is galloping and feeble, and he frequently succumbs.

There is always marked clouding of consciousness, familiar faces are unrecognised, and mistakes of identity are common. There is generally inability to recognise surroundings, and complete loss of memory. The patient is usually sleepless, probably talking continuously throughout the night. Food is refused, and if given by force there is often vomiting or it is passed undigested.

The bodily signs and symptoms are very prominent in this type of mental illness, and transient states of acute delirium are commonly met with in the course of mania, severe diseases such as pneumonia, alcoholic poisoning, and some of the infectious fevers. The cases seen in mental hospitals, however, have generally arisen as the result of extreme exhaustion, or sometimes epileptic seizures. In every case there is evidence that the body as a whole is being poisoned by an infection of some sort (a general toxæmia). The rise in temperature may not always be apparent, but if the temperature is taken regularly at intervals of four hours, it will almost certainly be found to be raised sooner or later. Examination of the blood generally reveals an increased number of white cells, this being evidence that the body is making an effort to overcome some infection.

There is hardly any condition which makes greater demands upon the skill of the nurse than the treatment of a severe attack of delirium. It is one of the few forms of illness found in mental hospitals in which the life of the patient is in serious and immediate danger, and in many cases it is entirely a question of the nursing the patient receives whether it ends fatally or in complete recovery. Only a few of the special nursing requirements are indicated here—namely:

1. Rest in bed, and continuous supervision. Every effort should be made to prevent the patient from becoming exhausted, and the utmost tact is required in dealing with the extreme excitement.

2. Careful feeding, at short intervals, both day and night. If tube-feeding becomes necessary, it is well to have in readiness appliances for washing out the stomach, as they may be required.

3. In many cases enemata of normal saline solution may be ordered.

4. Sleeplessness and excitement can sometimes be relieved by tepid sponging.

5. A record should be kept of the amount of urine passed and the time at which it is passed, and the nurse should be on the look-out for distension of the bladder.

STATES OF CONFUSION.

In some of the conditions previously described, it will have been noted that **mental confusion** is present, but only as a subordinate feature.

In a number of cases, however, states of confusion will be recognised which cannot conveniently be described under the foregoing heads. Speaking broadly, these states are intermediate between delirium on the one hand, and stupor on the other. Some cases of confusion so closely approach delirium that it is difficult to draw a hard-and-fast line between them. There is similar clouding of consciousness, with incoherence of thought and speech, failure of memory, and fleeting hallucinations. The severe symptoms of bodily illness, however, are usually absent.

In other cases there is a dreamy, apathetic, unresponsive, dazed state of mind which closely resembles stupor. Between these is a great variety of cases which need not be described at length, in which the consciousness is never really clear, while there is generally marked disorientation, and mistakes in the identity of persons around frequently occur. Hallucinations are common but not persistent, and the delusions which exist are usually transient. The whole picture is vague and shadowy, and the examination of the mental state is difficult, owing to the lack of definiteness in the train of thought. The conduct of the patient is impulsive and uncertain, and favourable cases often have periods of perfect clearness of mind which at first are brief, but which tend to be prolonged until permanent sanity is reached. On recovery, patients know little of the incidents of the illness; probably only a few shreds of

memory-pictures remain. These may sometimes refer to the conduct of the nurses, who have had to control them during a violent impulse. As a general rule, false accusations are rare, as the patients are able to recognise that they have lost days or weeks of their life, and usually can remember some of their strange delusions.

States of confusion arise from many causes, of which alcoholism is the most common, but they may develop after the specific fevers and after childbirth. Confused states also occur in epilepsy. Patients approaching convalescence after a severe attack of acute mania may also for a time be confused and dazed.

STATES OF STUPOR.

A patient suffering from **stupor** presents an appearance that cannot easily be mistaken. In a well-marked case, he stands motionless for hours, apparently hearing nothing, seeing nothing, and saying nothing, with blue, cold extremities; saliva dribbles from the mouth, urine and fæces pass unheeded, and probably, if food be placed in the mouth, it remains unswallowed.

Although possibly consciousness is clouded to some extent, such patients are not unconscious; they maintain their position, and usually walk with slow, dragging steps when assisted or pulled along; and, notwithstanding their apparent inattention, it is not uncommonly found afterwards that much of what has happened is recollected. The circulation is defective.

Stupor should by no means be regarded as a special mental disease, but as a phase into which many patients pass in the course of their illness. It is, as a rule, temporary, although occasional cases are met with in which a patient remains in a state of stupor and slowly sinks into permanent mental enfeeblement and dementia. Stupor is met with in varying degrees, and is closely related to confusion. It is indeed impossible to distinguish between some states of confusion and mild states of stupor.

Stupor may be described as a state of temporary dementia. For the time being, there is little difference between the patient in a state of profound stupor and the patient who is hopelessly demented as the result of some long-continued mental disease. The similarity, however, is only an apparent one, because in the stuporose patient there is generally no real and permanent brain

damage, and recovery is very probable. It is difficult to divide states of stupor satisfactorily into classes, but there are two main groups which it is important that the nurse should be able to distinguish from one another.

(1) **Exhaustive Stupor.**—This has sometimes been described as **anergic stupor.** It is an extreme state of limp will-lessness, with very greatly reduced activity of all the senses. It is due to temporary profound exhaustion of the brain, and may be regarded as an attempt on the part of the brain tissues to rest and recuperate after some violent mental disorder, such as delirium or acute mania. The pulse is slow, the action of the heart is feeble, there is a tendency to swelling of the feet and ankles, with blueness and coldness of the extremities. The patient's tongue is furred, his breath is offensive, his bowels do not act, and enemata are required. His limbs may be moved passively without resistance on his part; he permits any amount of pinching, pulling, or manipulation, and merely drops back to a resting position when left alone. He shows little or no evidence of response to any external stimulus, nor is there any sign that he has hallucinations or delusions, or indeed that he thinks, feels, or wills at all. The whole condition may be put in a nutshell by saying that such patients are practically mindless until they have recovered from their profound exhaustion. In cases of manic-depressive insanity some patients pass into a temporary state of stupor not unlike that which has been described, and the view that their condition can be ascribed to some horrifying delusion is incorrect.

(2) **Katatonia or Resistive Stupor.**—This state has one or two important points about it which mark it off clearly from the state which has been described. The picture presented by the patient may vary a good deal, but in every case he will show signs of the resistiveness which is characteristic of this condition. If his arm is taken the muscles will be found firmly braced, and any attempt to move it will be resisted with more or less vigour. His face, instead of being lax and limp, is set in a frown or possibly a grimace, and his eyes are in a fixed stare, or perhaps tightly closed.

In addition to these signs of muscular tension he will show some or all of the general symptoms of stupor which have been described, and at first sight may resemble a case of the exhaustive type. The great and important difference, however, lies in the

fact that patients in resistive stupor are extremely liable to sudden, impulsive actions, which may be altogether unexpected, unless the nurse fully realises the nature of the case with which he has to deal, and which may have very serious consequences. The impulse may be of many different kinds. For example, a patient who is sitting or lying in apparently deep stupor may suddenly jump up, seize a dish or flower-pot, smash it on the floor, and then quietly sit down again as if nothing had happened. But the real danger of this state lies in the fact that the impulse may be homicidal or suicidal, and thus a patient who is to all appearance harmless, helpless, and almost mindless, may, in a few moments, inflict severe or even fatal injuries upon himself or someone else. One patient, after lying for weeks in a state of deep stupor, suddenly jumped up, darted into the attendant's room, unlocked a drawer, seized a razor and cut his throat. Although apparently unconscious of his surroundings, he had watched the attendant go out, leaving his key in the lock and the door of the room ajar. Another patient, who had not made a voluntary movement for weeks, suddenly got out of bed and furiously attacked the patient in the next bed, inflicting very severe bruises.

This form of stupor is chiefly met with in the course of the disease called dementia præcox, and often passes, on the one hand, into a condition of negativism, in which resistiveness is pushed to such a point that the patient attempts to do the exact opposite of whatever is desired, or, on the other hand, into a condition called catalepsy, in which he faithfully copies every movement which is made before him, and, if placed in any grotesque attitude, remains in it for minutes or even hours at a time.

The nursing of cases of stupor consists largely in attending to the bodily health and the condition of the bladder and bowels, and in the careful administration of food. Sometimes tube-feeding may be required for months together. There are two special points which should never be forgotten by the nurse. The first is the possibility, in resistive stupor, of some sudden impulsive action, and the second is the fact that the majority of stuporose patients, on recovery, remember what has taken place during their stupor. The instance may be given of a patient who, having been mute and apparently unobservant for weeks, suddenly said to the doctor who had just

administered a tube-feed: "You will have your reward." The doctor recognised this remark as being associated with one she herself had made to a nurse a day or two before in the presence of the patient—viz.: "I suppose we shall have our reward some day." It is therefore in the highest degree unwise to speak or act before a stuporose patient in a way of which one is not willing to be reminded, perhaps months later.

Hot baths, massage, and electrical treatment are often ordered in states of stupor, and abundance of fresh air is of great importance. Whenever possible, stuporose patients should live largely out-of-doors.

STATES OF DELUSION.

Delusions are a feature at one time or another of practically every form of insanity, but sometimes they are transient, and disappear when the patient begins to recover. There are a great number of cases, however, in which the delusions are the principal feature, and may remain practically unaltered year after year. In these cases the mental disorder appears to be primarily an intellectual one, and is known as **delusional insanity.** It is these states of chronic delusions which we must now consider. They occur in very great variety, and it will not be possible to mention more than a few of the more common types. In one set of cases the delusions seem to have extremely little influence upon the conduct of the patients, who may hold the most absurd ideas, and yet work steadily in the wards or at some other useful occupation in the institution, as clerks, storekeepers, messengers, etc. At the first few interviews nothing may be noticed amiss, and the patient will converse reasonably on general topics; but as soon as his peculiar beliefs are mentioned, the most extraordinary delusions are unfolded. Fixed delusions of exaltation are common. The patients believe that they are persons of great importance—kings, dukes, or emperors —who may have been changed at birth. Their delusions differ from those which will be described later under general paralysis in that they are supported by argument, and voluble explanations are given of the strange facts asserted. There is little tendency to dementia, and many of the best workers and most useful patients are of this class. All these cases have probably passed through a more acute stage, in which the delusions exerted a much greater effect upon conduct and rendered the patient quite

unfit to do any work. But gradually his condition has become stationary, and he is able to adapt himself to his institution environment, and settle down as a more or less eccentric, but comparatively reasonable, being. Many somewhat similar cases show fixed delusions of suspicion, but such patients are less ready to take up an ordered and useful life in the asylum, and are more likely to become irritable and querulous. They often imagine themselves to be the victims of persecution by unseen foes, or perhaps worked upon by electrical currents, telephones, wireless telegraphy, or X rays. All the newest scientific ideas are adopted to describe the mechanism of persecution, but usually by persons quite ignorant of the nature of the agency they blame.

Sometimes the delusions refer to the body or internal organs, and the patient may believe that he is made of glass, that snakes or lizards are living in his abdomen, or that his brain has softened and run out of his skull. The latter ideas are probably due to illusions, dependent on sensations received from the organs in question. Delusions influence conduct in varying degrees, but usually much less than one would expect; and patients will relate their horrible sufferings without the least sign of distress.

The strangely inconsistent attitude of all delusional cases will be noted by every intelligent nurse. The patient who owns the hospital and every building in England, whose slaves are the doctors and attendants, is not in the least ashamed to beg them for a penny or a fill of tobacco. The " queen " of fabulous wealth may be seen cheerfully helping to clean the floor, quite unconscious of the incongruity of her pretensions and her occupation. The reason for this may be given in a word. The fact is that the patient's mind is in a state of what is known as " dissociation," so that the two incongruous ideas never actually come together. Hence he cannot compare them with each other. A minor instance of the same thing may be seen in the man who is a model husband and father and a sincerely pious church-goer, but who is known in his business as greedy, unscrupulous, and dishonourable. Here the life is really split into two compartments, but the fact that the man never surveys them both at once prevents him from realising his own inconsistency.

Progressive Delusional States.—Apart from the types above described, there is a large class of chronic delusional cases in

which the delusions are woven through the entire mental framework, so that the patient's whole life and conduct are profoundly affected by them. Such delusions are arranged in a more or less completely organised system, and are therefore called **systematised.** This progressive delusional insanity is generally called **paranoia,** but that term is used in various ways by different persons, and is therefore unsatisfactory. A description of an average case of this disease will now be given.

The disorder usually begins in early life, and the subject of it, though by no means deficient in intelligence, is moody and fond of solitude, does not readily join in games, and early begins to think he is misunderstood by his friends. For a time he may succeed in business or some other occupation, but in early manhood suspicions begin to develop. He begins to blame others for any untoward occurrence; he thinks he is unfairly treated, and throws up his occupation and starts again elsewhere. But he is only persecuted and thwarted, perhaps by unseen enemies, who dog him in all he attempts. By this time hallucinations and illusions begin to trouble him; and he imagines that people shout after him in the streets, or make suggestive signs as he passes. All the time, however, he is conscious of being superior to those about him, and attributes his repeated failures to the malign influence of others. He tries for a time to circumvent his enemies or one particular enemy; he pastes paper over the keyhole, endeavours to catch the offender in some hostile act, suddenly darts out of his room if he hears an unusual sound, or closely and furtively watches some suspected person. But his efforts are unsuccessful, and, at last, goaded to desperation, he lays plans for murdering his supposed foe. This steady growth of delusions of persecution, beginning with vague suspicions, and ending with the conviction that certain persons are persistently hostile, is characteristic; and unless the patient be placed under care some deed of violence is only too probable. A number of public men, such as President Garfield, have lost their lives at the hands of paranoiacs whose mental trouble had not been recognised by their friends and relatives.

In some cases, by slow degrees, there appears a change in the delusions; the patient begins to think that his persecutions prove him to be a man of importance. He has always had a high opinion of his own abilities, but now definite delusions of grandeur develop. Formerly he concealed his delusions; now

he proclaims them to the world; the hallucinations become worse, and he is often noisy and abusive. Thus he remains for years a dangerous patient, suspicious, resentful, often sulky, and altogether unresponsive to kindness, turning to rend those who would befriend him, unable to obtain comfort, and causing much distress to everyone with whom he comes in contact.

Of course, every such case has a wealth of incident and detail peculiar to itself alone. The great point which they have in common is what is sometimes referred to as the paranoid temperament—namely, a moody, solitary, "shut-in" personality, which is the soil necessary for the growth of this disease. There are few mental disorders so unsatisfactory to deal with as this systematised and progressive delusional insanity, and very often the most devoted efforts to gain the patient's confidence and to help him are absolutely unavailing. At first, indeed, such patients may hail a new and sympathetic official as a friend and deliverer, but in a short time enthusiasm is replaced by coolness, then suspicion, and finally bitter denunciation and contempt. When the patient finds that the new friend does nothing to right his wrongs, he soon regards him merely as a fresh enemy, conspirator, or spy.

In dealing with such cases, both sincerity and tact are needed by the attendant. It is wrong to tell a patient that one agrees with his views, and there should be no hesitation in letting him see, if necessary, that one thinks him mistaken. On the other hand, a tactful attendant can often quiet down a delusional case without saying in so many plain words that his ideas are absurd.

Such patients may become acutely dangerous if their suspicions finally settle, as they often do, upon one definite person. When this happens a murderous attack may follow, quite without warning, and a very large proportion of the accidents which occur in asylums are due to this cause.

Chronic states of delusion are often met with in mental disorders connected with the abuse of alcohol and in dementia præcox.

STATES OF MENTAL ENFEEBLEMENT.

Weakness of mind is found in practically all mental diseases, but in what is known as a state of mental enfeeblement there is such a lack of intelligence and memory, and such degradation of conduct and childishness of behaviour, that these form the

principal features of the case. This condition may obviously arise in one of two ways. In the first place, it may originate at birth or at a very early age, with the result that the mental development never reaches the normal standard, and the individual, throughout his life, remains mentally defective. These cases form a very large and important class, and are dealt with in Section XIII.

In the second place, states of mental decay and enfeeblement may arise in persons who have been of perfectly sound mind, as the final result of injury or disease. It is these states of *acquired* mental enfeeblement with which we are now concerned. The condition is generally termed dementia, and a general description of it must now be given.

Dementia.—The hall-mark of dementia is enfeeblement of the mental powers. Self-control, judgment, the capacity for connected thought and the perception of external impressions, are usually all impaired. There is also great lack of initiative and failure to assimilate new ideas. The chronic irrecoverable cases in our mental hospitals are mostly those of dementia; and the degree of enfeeblement varies greatly. The condition is generally a slowly progressive one, in which gradually increasing signs of failure in conduct may be observed from year to year, but in many cases the patient's state becomes apparently stationary after a certain depth of dementia is reached, and no further change is obvious. Dementia, as we shall shortly see, is very often the result of acute or repeated attacks of various forms of mental trouble, and in some cases many traces of these remain. Hallucinations and delusions may persist to a greater or less extent, and every now and then the old symptoms may flare up again like a dying candle in the form of sudden impulsive actions. As a rule, however, the various active signs of mental disorder pass away, and the symptoms of dementia become mainly negative ones, such as a failure of intelligence and a deficient control over conduct, which prevent the discharge of the minor duties of life, except under sheltered and ordered surroundings. The conduct of demented patients generally shows a failure to respond to the demands made by the ordinary customs and conventions of society. A cultured lady, formerly punctilious and refined in all her ways, may acquire careless, slovenly, and even dirty habits when enfeebled in mind; and profound cases of dementia are unable to respond to any external demand,

cannot attend to the commonest wants of nature, have not even sufficient initiative to ask for food, and can only swallow it in an animal fashion when it is actually placed in their mouths. A large proportion of the patients who are manual workers are cases of what may be called arrested dementia, in which a regulated life and efforts at re-education have helped to ward off further degradation. Once a demented patient has been taught a certain task, he will perform it in an absolutely reliable, regular, machine-like way, but without the intelligence and judgment which differentiate a man from a machine. For example, it was the task of one demented patient to water a certain rose-garden every evening at 6.30. This he performed with absolute punctuality, but one evening he was found quietly and contentedly carrying it out, although the ground was inches deep in water after a day of continuous rain and storm. Another demented patient had to wheel a barrow containing cinders from the engineer to the gardener, who emptied his barrow for him, turned him round, and sent him back for a fresh supply. So limited was his understanding of the object of his task that when the gardener turned him round *without* emptying his barrow, he returned unhesitatingly to the engineer with the full load.

The bodily health in dementia is usually good, although there may be a diminished power of resistance to infective disorders, such as tuberculosis, especially in the case of deeply demented patients who sit or stand about with heads bent and cannot employ themselves. Under favourable conditions, however, even extreme cases of dementia often live to a great age. The very nature of their illness renders care in an institution necessary, and they are consequently protected from the wear and tear of ordinary life, and come under a healthful routine and supervision.

Cases of dementia are usually grouped into classes, according to the manner in which they have been produced.

(1) **Terminal or Secondary Dementia.**—This term is used for the enfeeblement of mind that in many cases follows acute mental disturbance. The recovery is only partial, and a permanent condition of mental weakness is left. Sometimes the patient may suffer from repeated attacks of acute mental illness, and after each recovery he may be noticed to have lost a little ground. In other cases—for example, a state of acute con-

fusion—the attack, instead of passing off rapidly and completely, may run a long and tedious course. The acute symptoms may gradually disappear, and the patient may finally drift into a state of apparent convalescence, but with a distinct and permanent, although possibly slight, degree of dementia. Such a patient, although perhaps unable to resume full responsibilities, may be capable of very useful work in a limited sphere. Alcoholic and epileptic insanities tend towards a terminal dementia, as does general paralysis, in which mental enfeeblement is always a striking feature. This will be referred to later when we consider these diseases.

(2) **Organic Dementia.**—This term is used to express the weak-mindedness which follows actual injury to or disease of the brain, such as a hæmorrhage or tumour (see p. 482).

(3) **Senile Dementia** may be regarded as little more than an exaggeration of the usual signs of old age, and will be discussed under the heading of senile mental disorders (p. 469).

(4) **Premature Dementia or Dementia Præcox.**—This is a very important disease, which must be discussed at some length. It is mentioned here because it tends towards a very profound and complete dementia; but it is marked off from the other forms of dementia by the fact that the dementia sets in and develops from the very beginning of the illness, and is not secondary to other forms of insanity.

DEMENTIA PRÆCOX.

Dementia præcox is a form of progressive mental enfeeblement, the symptoms of which usually begin to show themselves during the period of adolescence—that is, any time between the ages of seventeen and twenty-five. In adolescence the individual, for the first time, is seriously tested as to his fitness to discharge life's responsibilities. He leaves behind him the care and protection of his parents or guardians, and enters, with all the freshness, activity, and ambition of early manhood upon a stage of his life which is full of problems, difficulties, and dangers. It is not surprising that in this period of storm and stress, when self-restraint and self-control are so severely tried, any inherited mental instability is very likely to show itself, or that the individual's incapacity to stand the ordeals confronting him may be revealed by some nervous or mental disorder.

Attacks of mania and melancholia may first occur in the adolescent period, and we have already seen that about this time chronic delusional insanity may begin to manifest itself, as may the insanity connected with epilepsy which we have yet to consider. But of all the forms of mental disorder occurring during this period, dementia præcox is much the most important.

As a general rule, patients suffering from this disease were not backward at school, and, indeed, some were exceptionally brilliant, but a great many are reported to have been moody, solitary, and disinclined to join their fellows in sports and games. This temperament is often referred to as the shut-in personality, which was referred to in our discussion of chronic delusional insanity.

Dementia præcox is characterised by apathy and loss of interest in the affairs of life. Its onset is usually slow and insidious, and its course very variable in length. It usually terminates in an extreme degree of dementia. In a few cases the onset is apparently sudden, and there is an unmistakable attack of mild excitement, or perhaps of quite unexpected and unreasonable depression; but as a rule the earliest symptoms may be only unusual indolence and carelessness, and a tendency on the part of the patient to lounge through the day, indifferent to the harm done to his prospects or the remonstrances of his friends. The disease develops so insidiously that very often he is not recognised as being abnormal for months or even years, and only on some special occurrence, such as a visit to another house or an event of importance, does his complete failure to rise to the occasion raise the question of his mental state. When once this has happened, his friends, on looking back, can generally point to many small departures from the normal which they have observed in his everyday life for past months or years. It is very probable that in cases where the disorder seemed to begin more suddenly it had really been going on for a long time.

As the disease progresses the most striking symptom is the patient's emotional indifference. He takes no interest either in duty or pleasure, and displays no affection even for those who were formerly his dearest friends. This is coupled with a gradually increasing silliness, and loss of the power of connected thought. He makes little or no mental effort, and becomes untidy in his dress and probably faulty in his personal habits.

At about this stage, or even earlier, hallucinations, and

delusions founded upon them, generally appear. This is a point of the very greatest importance. The reader will have noticed that the symptoms of dementia præcox are very vague and negative, and they are extremely difficult to describe clearly or to observe with certainty. Thus, the presence of hallucinations, which most authorities consider an absolutely essential symptom of the disease, is a positive sign of immense value. These hallucinations and delusions are usually of an absurd and disconnected character, and seem to have no obvious relation to the general state of the patient's mind. For example, a well-educated girl suddenly spoke of the "holy viper," and could give no idea of what she meant. Another patient was tormented by unseen persons whose conversation consisted of the two words "bun" and "cookie." He had no objection to the former word, but the latter, for some reason he could not explain, made him furiously angry. Sometimes the hallucinations may be terrifying, or may take the form of definite orders, and sudden impulsive violence may occur in consequence. One patient, out of a jumble of apparently meaningless hallucinations, received a divine command to refuse to go to bed. This resulted in a nightly struggle for months, although, except at bedtime, he was as gentle and mild as one could desire. The emotional incoordination described in the previous section is frequently seen at this stage. There is a tendency to eccentric habits and mannerisms of all kinds, peculiar movements of the limbs, strange attitudes, grimaces, and often sudden and unexplained outbursts of laughter or of tears. Along with all these symptoms, it should be noted that there is very rarely any serious confusion or disorientation. The patient will give his name, age, and so forth, quite correctly, can tell the names of those about him, knows where he is, and how long he has been in the asylum, and appears to understand quite clearly the questions which are put to him. It is noteworthy that many patients suffering from dementia præcox, and apparently stupid and silly, will now and then utter a "cute" remark or give a very shrewd reply to a question. Sometimes they write letters which really begin well, but then wander off into apparently hopeless nonsense with much repetition. There is no serious impairment of the bodily health, and as a general rule nutrition is well maintained, although many patients are pale and unhealthy-looking, with poor circulation, and blue, cold hands.

The outlook in dementia præcox is extremely unfavourable, and the tendency is towards profound dementia, although the course of the disease is very variable, and the terminal state may not be reached for years. In many cases periods of considerable apparent improvement, known as remissions, occur, and may be sufficiently complete to allow the patient to return to his friends. Almost invariably, however, such improvement is only temporary, and after a few weeks or months the symptoms reappear and the progress towards dementia is resumed. This tendency towards dementia, which is implied in the name of the disease, and which exists from its earliest states, makes us hesitate to regard as "recoveries" those occasional cases in which a remission is so complete and so enduring as to give rise to the hope that the patient may remain permanently well. The dementia finally reached is of a low grade, as a rule, and its victims form a large proportion of the chronic and incurable cases. Generally they are unable to occupy themselves usefully; they are habitually faulty in their habits and degraded in their conduct, and altogether unpromising from the nursing point of view. They remain indifferent to external influences, and can rarely be trained to help in the simplest kind of ward-work.

Dementia præcox has been divided into a number of different forms, and three of these need special mention, in addition to the general description given above, which corresponds to what may be called the "simple form." The **katatonic** form is important, because it tends to run a shorter and more active course, and the progress towards dementia has been said to be more rapid if the disease is of this type; but it is doubtful if this is the case. It is distinguished by the states of excitement and stupor which occur during its course. The excitement is of a peculiar kind, with various strange muscular contortions, sudden impulses, stereotyped movements, mimicry of others, and senseless repetition of words and phrases, while the stupor is of the type which has already been described as resistive. A good deal may be done to prevent the onset or minimise the severity of both these by careful nursing and individual attention. The leading symptoms of dementia præcox are, of course, also present.

In the **hebephrenic** form the patient is solitary and moody. He haunts the least frequented parts of the ward and grounds, and takes little notice of what goes on around him. If addressed

he will smile foolishly, although his prevailing emotional state appears to be one of depression. As time goes on, he becomes more and more apathetic, untidy in his dress, and regardless of the calls of nature, until he reaches a condition of apparent mindlessness.

The **paranoid** form is the one in which the hallucinations and delusions mentioned above are most prominent. It has been mentioned that these are of an absurd and disconnected character, and the patient often has an unusual way of expressing them. He may say, for instance, that "thoughts are projected into my head," or that "someone else is thinking with my brain." The delusions are of a grandiose or persecutory type, disjointed and fantastic. A sufferer from systematised delusional insanity may assert that he is the rightful king of England, but the victim of paranoid dementia præcox is more likely to announce himself as the "Monarch of Mars," and will often decorate himself with ribbons or metal buttons. Again, the former type of patient may give out that he is persecuted by means of wireless telegraphy, while the latter will coin a new word for the agency by which he thinks himself worried. This form of dementia præcox is the one in which remissions are the most uncommon, and the patient as a rule makes steady progress towards the final stage described above.

It must not be forgotten that all three forms of dementia præcox display the symptoms given under the general description, in addition to their own special characteristics. Sometimes there is a change of type. For instance, a case which at one time was hebephrenic, may pass into the paranoid form.

The nursing of dementia præcox is apt to be a depressing task, but there is no doubt that individual care and attention can do something towards combating the patient's apathy, and may prevent him from sinking into a stuporose state. It has been said by a great authority that a large proportion of cases of katatonic stupor in a mental hospital indicates the badness of the institution, and by this is implied that the prevalence of such stupor results from the lack of individual attention and effort.

SENILE MENTAL DISORDERS.

As years increase and old age approaches numerous physical and mental changes occur in the ordinary course of nature.

These are the result of degeneration in the arteries and tissues. Should the patient have suffered from any disease, such as syphilis or alcoholism, likely to hasten this degeneration, its results will occur at an earlier age, so that a person of sixty, both as regards body and mind, may be comparable with the average person of seventy. These cases are often called pre-senile.

A wrinkled skin, shrunken figure, declining strength, slowness of movement, a tendency to unsteadiness of the limbs, and a gradual failing in the acuteness of the senses, are the natural bodily accompaniments of old age, and it is equally natural to find a group of mental changes, such as a failure of the powers of attention and of memory, and inability to take in new ideas. Most of us have had the opportunity of observing the picture presented by healthy old age. The mind of the old man tends to dwell in the past; he may remember clearly many trifling incidents of long ago, but recent events make little impression upon him and are readily forgotten. When old memories are recalled, however, there is a quickening of intelligence; his eye lights up at the thought of past scenes of excitement, he holds his body more erect, and tells his stories of bygone days, emphasising them with active gestures. His failing memory, however, frequently leads him into repetition, and often so many errors of time and place creep into his story that it becomes quite untrustworthy. His inability to take any active part in the affairs of to-day is accompanied by a great diminution of the interest they rouse in him. While he may understand the account which is given to him of some important happening, he will show little enthusiasm, and will probably fall back on similar happenings of many years ago, which seem to him of incomparably greater significance. He becomes rather fussy, and is apt to be upset by trifles. A long argument confuses him, a loud noise disturbs him, and any alteration of his routine existence is apt to cause him distress. In spite of all this, he is probably quite assured of his ability to manage not only his own affairs, but those of others, and he strongly resents being "looked after." Now it is not possible to draw any definite dividing line between these natural failings of advancing years and insanity due to or accompanying senile decay, and a very large number of old persons reach an indefinite borderland. Many of them, for example, forget where their papers are kept,

how their money is invested, and what their income is, and yet when reminded of the facts their judgment on any point may be quite sound. Such persons, however, require a great deal of attention and assistance, especially if the bodily symptoms of old age are also pronounced; and nurses are often engaged for this purpose.

A nurse so engaged must be prepared, as we shall see shortly, to meet with very varied symptoms, from the slight indications of normal old age up to acute excitement or depression, or a considerable degree of dementia. In all such cases her position is one of very considerable responsibility, as she may have great influence over the patient while he is still regarded as sane and able to conduct his affairs. As this gradually becomes increasingly difficult, the relatives may ask the nurse to assist them in getting the patient to transact his business and sign papers, cheques, or other documents, because of her ability to humour him, and to explain the situation and induce him to do what is desired. The end in view may be perfectly right and proper, but nurses should make it a rule to take no part in such matters, and not to become in any way mixed up with the private affairs of the patient. Neglect of this warning may involve them in great legal difficulty or even scandal.

In many cases the mental changes accompanying old age become so pronounced that special care is needed, and patients are then admitted into mental hospitals as suffering from some form of "senile insanity." The number of these patients is increasing rather than diminishing, owing to the passing away of the old ignorant horror of asylums. The forms of derangement which senile patients show are extremely varied, and states of excitement, depression, and confusion all occur. A form of melancholia, with delusions of destitution or suspicion, is especially common, and mania with restlessness and noisy shouting, especially at night, is also frequent. These cases often recover in a remarkable way or they may settle down into a much less active state, although sometimes the depression or excitement continues until the end. States of confusion are very common, as one might naturally expect, as a result of failing memory and defective power of adaptation to changing circumstances, and there are cases of hallucinations and fleeting delusions which are held while they last with a childish obstinacy. Many patients show the failing power of self-control

by obscene conversation and behaviour, though their records may be blameless and honourable. In some of these cases there may be a bodily factor, such as local irritation from disease of the bladder. Another type of case is very dull and apathetic, and may be easily induced to do anything required.

A great many cases show no very marked excitement, depression, or confusion, but simply a progressive dementia which is not easy to distinguish from the usual signs of old age, except that the mental enfeeblement becomes gradually more extreme. Loss of memory is one of the most prominent symptoms, and there may be great disorientation, but these are both uncertain and uneven. At one time all is forgotten, while at another flashes of recollection brighten up the whole mental outlook. Besides the failure of memory, there are deficient judgment and self-restraint, sudden unreasoning anger, great irritability and querulousness, uncalled-for passionate weeping, and a childish elation at trifling incidents.

Few cases are more responsive to careful nursing than senile patients. They may be quite unable to say where they are or note the names of those about them, and yet as a rule they are very grateful for attention and appreciative of the care they receive. The change that can be wrought in a senile patient in a few weeks by good nursing is quite wonderful. Nothing but experience and insight can teach a nurse when to be firm, when to give in, when to sympathise, what to say and how to say it. One or two points, however, may be mentioned. Senile patients are very often worse at night, and if left alone they are apt to get out of bed and hammer at the door until attended to. This tendency to excitement can generally be lessened if there is continuous supervision by a night nurse, and many senile patients sleep much better in company with others and in a lighted room. Hot milk given during the night, in addition to any sedative that may be ordered, often helps to subdue excitement and produce sleep. The patients soon tend to fall into a routine with regard to sleep, as well as everything else. It must be remembered that senile cases require a great deal of rest, not necessarily sleep, and that they are apt to exhaust themselves. They are, moreover, very frail, and fractured bones occur from trivial causes. The possibility of bed sores is, of course, always present in bedridden cases, and a very weak, though restless,

patient is liable to roll out of bed and sustain considerable injury if not carefully supervised.

Patients able to be up will often need supervision in matters concerning dress and toilet, and it is important to avoid things that may cause a fall, such as dangling tapes, dragging skirts, and unsecured stockings. The diet should be easily assimilable, as varied as possible, and given in frequent small quantities rather than large heavy meals.

MENTAL DISORDERS CONNECTED WITH ADDICTION TO ALCOHOL AND DRUGS.

Mental disorders due to alcohol are unfortunately very common, although in recent years there has been a slight decline in the numbers of alcoholic patients admitted to mental hospitals. Many of these have a bad family history, are born with defective self-control, and, in addition, are peculiarly susceptible to the action of alcohol. In some cases patients drink as a direct result of the mental disorder from which they are suffering. This is to be seen in general paralysis and in mania, where the resulting loss of judgment and self-restraint may lead the patient to intemperance. Depressed patients, too, often indulge in alcohol in the attempt to get relief from their misery. Again, in dipsomaniacs, the periodic bouts of intemperance are due to some mental or emotional cause from which the patient finds relief in this way. In spite of this, however, there is no doubt that alcoholic excess is in itself responsible for a considerable number of admissions to mental hospitals, though it is usually associated with some other predisposing condition, such as bodily disease or hereditary mental instability.

It is important to remember that the effects of alcohol are extremely diverse, and that the amount required to produce symptoms varies very greatly with different individuals. Some old topers seem little the worse for habitual indulgence, while in other cases comparatively small quantities of alcohol will soon cause disorders of the stomach, liver, and kidneys. Sometimes, again, the consequences of chronic alcohol poisoning are seen in disease of the peripheral nerves (polyneuritis), while in those with which we are mainly concerned the brain is the organ which is affected, with resulting mental disturbance. The effects upon the brain are extremely varied. A few individuals are rendered

temporarily insane by quite small doses, but more commonly definite mental symptoms only make their appearance as the result of long-continued habitual indulgence.

Almost any of the states of mental disorder which have been described may be found in cases in which alcoholic intemperance has been given as the principal cause. It will be convenient to describe these under two headings: those which are acute and those which are chronic in character. There are two forms of acute mental disturbance connected with alcohol with which the nurse should be familiar.

Transient Alcoholic Mania.—This is a condition of sudden frenzy occurring in connection with a drinking bout before the effects of the alcohol have passed off. As a rule there is partial loss of consciousness, and the patient suddenly becomes violent, wrecks the home, brutally assaults his wife, or commits suicide. In some cases hallucinations prompt the deed of violence. The excitement rarely lasts long, and next day little or nothing can be remembered of it. A large proportion of the murders and suicides daily reported in the newspapers are due to transient alcoholic mania.

Alcoholic Delirium (Delirium Tremens).—In most cases some illness or accident occurring to a person who drinks excessively is the apparent cause of an attack of alcoholic delirium, but whether or not its actual exciting cause is the sudden deprivation of alcohol is still an open question. The general symptoms are those of delirium, already described. The following special features are found in most cases. A fine tremor of the hands, and also tremors in the muscles of the face; a cold, clammy skin; hallucinations of an unpleasant nature, usually visual, such as rats, vermin, devils, and horrors of all kinds; marked sleeplessness, and a tendency towards sudden, impulsive acts of almost any type. The patient's general condition is serious, the pulse is rapid, feeble, and often irregular, food is usually refused, the tongue is thickly furred, and sordes collect on the lips.

Delirium tremens involves grave danger to life in old or feeble subjects, or those suffering from pneumonia or other diseases. In favourable cases the symptoms subside in a few days, and recovery is usually complete. Very often the patient passes into a very profound and prolonged sleep and awakens convalescent. In the most serious cases he lies helplessly in bed

with a muttering delirium, picking at the bedclothes, and entirely sleepless.

The special duties of the nurse are to guard against impulsive outbursts and to watch for signs of collapse. The patient should be in bed in a darkened room, and there should be plenty of assistance at hand to control and manage him tactfully when his hallucinations are acute. The tendency to heart failure is increased by sudden exertion, and the patient should not be allowed to sit up suddenly even if he seems to be making good progress. Should collapse occur or be threatened, the doctor should be sent for at once. Careful feeding is of the utmost importance, and usually consists in giving small quantities of milk and concentrated broths or beef jellies at stated intervals.

Chronic Alcoholic Insanity.—The alcoholic insanity met with in asylums arises out of a state called **chronic alcoholism.** It is produced by habitual intemperance, in which a further quantity of spirits or other alcoholic beverage is taken before the effects of the previous one have passed off. This habit is only too easily acquired. Chronic alcoholism is accompanied by a certain amount of mental deterioration, slackness, and infirmity of purpose; but the condition may continue for years before any definite mental disease is developed. It not rarely happens that previous to the actual onset of mental disorder the patient may have abstained for some weeks, and that some other factor—family trouble, business anxiety, or bodily illness—may appear to be the immediate cause of the breakdown.

The forms of mental disorder arising in persons habitually intemperate are numerous. They are not distinctive, so that it is often impossible to distinguish the alcoholic element among the symptoms presented.

Polyneuritic Psychosis (Korsakov's Disease).—This is a disorder which is usually due to alcoholic excess, although some cases have occurred in connection with other poisons. The patient suffers from pains and tingling in the nerves of the limbs, a common site for these being the calves of the legs. The tendon reflexes are diminished or absent, and there are fine tremors of the lips and tongue. Mentally, the most striking feature is the loss of memory for recent events. The patient fills in the gaps in his memory with imaginary incidents, so that one who has been in bed all day may describe how he went out driving in the morning.

Alcoholic cases present all kinds of delusions. Hallucinations of hearing are especially common, and they may be of an imperious character, prompting impulsive acts, which may be either suicidal or homicidal. Delusions of suspicion and persecution of all kinds are common, and may be reinforced by hallucinations in harmony with them. Alcoholic patients are in consequence among the most uncertain and dangerous patients under care in mental hospitals. Delusions of unfaithfulness on the part of wife or husband are also frequent.

Complete recovery sometimes occurs, and afterwards little or nothing can be recollected of the illness, but more often these cases pass into dementia.

In other cases there is marked confusion, with impairment of consciousness. The patient is in a dazed, dreamy state, and unable to recognise persons and things around. Disorientation is often complete. Hallucinations are common, and also impulsive, aimless acts.

Mental enfeeblement due to alcohol may be a development of the partial enfeeblement occurring in chronic alcoholism; but more commonly it follows some acute mental disturbance. The dementia is rarely of low grade, and many patients are useful workers so long as alcohol is withheld.

A large number of symptoms of bodily disease are common in alcoholic patients, only one of which need be mentioned here. This is a tendency to epileptiform convulsions, frequently met with in alcoholic patients advanced in years. It is usually associated with disease of the cerebral vessels, and the fits are not true epileptic seizures.

The nursing of alcoholic cases requires little special description. In acute cases it must be remembered that in all probability too little food has been taken for a long time. Hence careful feeding at frequent intervals is very important. Alcoholic patients usually require most careful supervision on account of their impulsive tendencies.

Drug Addiction and Mental Disorder.—Some mention must be made of cases of mental disorder occurring as the result of habitual over-indulgence in certain drugs, of which morphine, cocaine, heroin, and veronal are the most important. The drug may first have been prescribed for the relief of some symptom, such as sleeplessness or pain, and as a result of its unwise or prolonged use the patient gradually becomes unable to obtain

relief without it, and finally is a complete slave to it. Most of us are familiar with the person who is a " slave to tobacco " and is miserable if he cannot procure a cigarette, but his condition is as nothing compared with the intense craving of the victim of a " drug " habit. The symptoms fall into two groups: those produced by repeated doses of the drug itself and those produced when it is withheld.

When the patient takes a dose of laudanum or an injection of morphine, cocaine, or whatever it may be, a sense of well-being rapidly follows. His aches and pains, sleeplessness, and nervousness disappear, and he soon feels strong, alert, and capable of good mental and physical work. The effect passes off, his symptoms return, and he finds that a gradually increasing dose is necessary to remove them again, till after some weeks or months he can take, with little or no effect, an amount of the drug which would perhaps be fatal to a person who was taking it for the first time. The true nature of the drug now becomes manifest, and the patient grows restless, irritable, thin, worn, and dyspeptic. The only cure he can find for these symptoms is a further dose of what was largely responsible for producing them, and so his condition rapidly goes from bad to worse. Moreover, his whole moral nature seems to undergo a degeneration, which is increased by his efforts to conceal the change from those around him. He is careless and neglectful of everything and everyone but himself and his cravings. He becomes deceitful and dishonest, and finally is literally incapable of speaking the truth, acting straightforwardly or behaving honestly. When such a patient submits to treatment we must begin it with the discouraging conviction that we cannot believe a word he says, and that in his heart he does not really desire to be cured, although he may protest that he does most solemnly. If the drug is rapidly withdrawn or completely withheld, another alarming group of " deprivation " symptoms makes its appearance. The patient seems to collapse, both mentally and physically. He is a nervous wreck, haggard and emaciated, restless, agitated, possibly suicidal, and certainly wretched. The original pain for which the drug was first taken will return with redoubled force. The patient's digestion may be hopelessly disordered, and he is cold and shivering. His circulation is weak and poor, and unless the drug is again administered he may quite possibly die. A few doses will have, for a time, an almost magical effect, and then the old state of

things returns, and we are left with the whole battle to fight over once again.

The treatment of such patients is extremely difficult. In some slight cases a rapid diminution of the amount of the drug given may be decided upon by the doctor, but more frequently he will adopt one of the various methods of gradual withdrawal. Nowhere is the most scrupulous attention to medical instructions so essential, and it must be remembered that some patients will descend to any depth of trickery or deceit to obtain the drug for which they crave. Attempts to hide a supply of it or a hypodermic syringe are quite usual, whilst efforts to bribe the nurse into disobeying the doctor are the rule rather than the exception. But when once such a patient realises that he is in the hands of a capable, kindly, and absolutely conscientious nurse, much may be done not only to increase bodily comfort, but to encourage and strengthen him by cheerful and sympathetic companionship.

PUERPERAL MENTAL DISORDERS.

There is no special form of mental disorder that arises in connection with childbirth, but as it is often the first severe strain to which the average woman is submitted, a breakdown is naturally not uncommon, just as at any other critical period of life, such as adolescence. Hereditary instability can be traced in about one-third of the cases of mental disorder which occur at this time, and which may be grouped under three heads —namely, those of pregnancy, those of the puerperium (confinement), and those of lactation (suckling).

Pregnancy Cases.—The most common form of mental disorder seen during pregnancy is a state of depression, with gloomy forebodings and delusions. Its immediate cause is the bodily disturbance due to the presence of the unborn child, but no doubt apprehension and fear also play a part. If the depression appears early in the pregnancy, recovery often occurs before the confinement, but if it appears later than the middle of pregnancy the patient may not recover until the birth of the child or, indeed, for a considerably longer period.

Puerperal Cases.—Mental disorder is said to occur in about one case in every seven hundred confinements, and the disorders arising at this time are now generally recognised to be toxic in origin—that is, due to bacterial absorption. Very commonly

the disorder takes the form of a melancholia which may be merely a continuation of depression existing before the confinement. The patient shows the usual symptoms of melancholia with delusions, tendency to suicidal attempts, etc., but the outlook is very favourable. The chief feature of puerperal mental disorders, however, is confusion in varying degrees. Sometimes there is a short, sharp attack of delirium, after which the patient either recovers completely in the course of a week or two, or passes into a state of acute excitement resembling that which has already been described in acute mania. Accompanying the mental symptoms there may be great physical weakness, and the condition may last for some months. A few cases remain in a state of chronic excitement, and after a year or so the outlook as regards their recovery begins to be unfavourable, but the great majority make excellent recoveries. In other cases the patient is confused, though not actually delirious, and this confusion tends to pass into a state of stupor in which she may remain for weeks or months. Here also, however, the outlook is a good one. There is nothing very new to note about the symptoms of these cases. It used to be stated that the patient invariably took a violent dislike to her infant, who must be removed from her at once lest she should kill it. Now, though such precautions are very necessary, since it is quite true that a depressed or excited patient will probably injure her child if she has the opportunity, she bears it no special ill-will. But she is in a state rendering her likely to injure anyone or anything about her, and a helpless infant would be most liable to suffer. Patients who pass into the state of excitement are often given to shameless and obscene conversation and indecent exposure, such as often characterise states of mania which have no connection with the puerperium.

The physical state of these patients must be continually borne in mind, and the nurse should be on the watch for any variations of pulse or temperature and for any changes in the lochia, which are the uterine discharges normal after childbirth. Alterations in the colour, quantity, and smell of these should be reported. The doctor may order hot douches, not necessarily for their antiseptic effect, but in order to increase the discharge through the local application of heat. The condition of the breasts should also be observed, and a look-out kept for abscesses or cracked nipples. It is generally advisable that the baby should

be weaned; and some application, such as glycerine of belladonna painted on the breast, will be necessary to suppress the secretion of milk.

Lactational Cases.—The usual line between puerperal and lactational cases is drawn at the sixth week after confinement, on the ground that the uterus by this time has resumed its normal non-pregnant condition. The general cause assigned is exhaustion caused by the continual flow of milk. Lactational insanity, like puerperal, is one of the acute mental diseases. The majority of the cases are of the depressed type; stupor and delirium occur, but are much less common. The average age is higher than among puerperals, and the disease is commoner in later pregnancies. Convalescence is apt to be tedious, but the recovery rate is even higher than the puerperal. The delusions in late lactational insanity are apt to be specially gloomy and imperative, and most cases of infanticide occur from this cause.

ENCEPHALITIS LETHARGICA.

This is a disease due to inflammation of the brain substance. Its most characteristic feature is an increasing lethargy and drowsiness, and hence the name " sleepy sickness " by which it is popularly known. Cases are seen, however, with acute mental confusion and delirium. Other prominent signs are tremors, incoordination, and temporary paralyses of muscles. These paralyses are specially frequent in the muscle of the eyeball, giving rise to double vision. The disease is often fatal. Some cases make apparently perfect recoveries even after a prolonged stage of dulness and confusion, but all degrees of mental enfeeblement and persistent muscular tremors are frequent sequelæ.

MENINGITIS.

Inflammation of the coverings of the brain and spinal cord is known as meningitis. It may be due to a number of different micro-organisms, and thus is met with as a complication of diseases in which other organs have been attacked first, such as pneumonia, syphilis, and tuberculosis. The tuberculous form is commonly seen in children and nearly always terminates fatally.

Meningitis may run an acute or chronic course. Its principal symptom and signs are intense headache, squint, variations in

the size of the pupils, vomiting, retraction of the head, moderate rise of temperature, convulsions, and coma. When nerves are pressed upon at their point of emergence from the brain or spinal cord, by the products of the inflammatory process in the meninges, there will be paralysis of the parts supplied by the motor nerves, and pain followed by anæsthesia in the parts supplied by the sensory nerves.

One form of meningitis is caused by a specific micro-organism, and is to some extent infectious. This is the disease cerebro-spinal meningitis, commonly known as "spotted fever," from the occurrence of a hæmorrhagic rash.

Meningitis is accompanied by mental disturbance, usually excitement, in the earlier stages. This gives place to depression before coma sets in. In some cases violent delirium occurs. Some imbeciles have been the subjects of meningitis in infancy. In these there is an increase in the size of the cranium from the pressure of cerebro-spinal fluid in the ventricles on the ununited skull-bones. This condition is known as hydrocephalus.

Management.—There is little that the nurse can do for the sufferer from meningitis beyond the application of an ice bag to the head, rest and quiet as far as is possible, and darkening of the room. The doctor may give instructions that the head is to be shaved. It must be remembered that the cerebro-spinal form is communicable, and the precautions usual in cases of infectious disease are to be taken.

APOPLEXY.

This term means a hæmorrhage into the substance of an organ. It is usually applied to the rupture of a cerebral blood-vessel, the consequent symptoms constituting an "apoplectic stroke." The patient may become rapidly unconscious, or the symptoms may develop more slowly and be preceded by headache or difficulty in speech. The patient is commonly a person who is advanced in life and whose arteries have become brittle. The usual history of an apoplectic fit is as follows: the patient has a convulsion or twitching, after or during which he rapidly becomes unconscious or comatose. He appears flushed, and the veins of the neck are distended; the breathing is slow, laboured, and noisy (stertorous), and there is puffing out of the cheeks during expiration; the pulse is slow, full, and soft.

There is hemiplegia on the side of the body opposite to that side of the brain in which the hæmorrhage has occurred, if the hæmorrhage is in any area above the pons. The patient may die or remain unconscious for several days.

Management.—The patient should be kept lying down with the head high and the neck free from all tight clothing. If he is placed on one side the breathing is relieved and the stertor disappears. An ice bag may be placed on the head and hot bottles to the feet. The risk of bed sores must not be forgotten.

HEMIPLEGIA.

By hemiplegia is meant paralysis of the body and limbs on one side. It is due to some disease of the opposite side of the brain, such as apoplexy. Other cerebral conditions which may produce it are thrombosis and embolism. Thrombosis is the term used for the clotting of blood in a vessel, and it may occur in the vessels of the brain as a result of atheroma, aneurism, or abnormal conditions of the blood. By embolism is meant the blocking of a bloodvessel by an obstacle carried in the blood-stream from elsewhere. This obstacle may be a minute portion of tissue from the valves of the heart, which has formed there as a result of rheumatic inflammation, or a piece of clot from a thrombus. In either of the conditions it will be seen that a portion of the brain is deprived of its blood supply, and if this portion contains any motor nerves or neurons the muscles supplied by them will be paralysed.

When the hemiplegia is complete both the arm and leg are powerless, and if the left side of the brain is the one affected there will be impairment of speech. In some cases partial or complete recovery takes place, but where there is no improvement there will be contractures of the paralysed limbs. The arm is bent across the front of the chest and the wrist and fingers also flexed. The patient walks in a characteristic manner, dragging the affected leg round in a semicircle with the foot scraping the ground.

ORGANIC DEMENTIA.

It will be readily understood that where there is such grave brain disease as has been discussed under the last two headings the mental processes must be affected. The symptoms will be of

the same nature as have been described when the changes due to senility and arterial disease were being discussed. The patient's emotions are easily aroused; he is fretful, irritable and childish, and takes little interest in what goes on around him. The memory is impaired, especially for recent events. Other affections of the brain which may produce similar mental symptoms are tumours, abscesses, injuries, and the results of inflammation due to syphilis, tubercle, or influenza.

It must be remembered that in many cases there will be additional signs and symptoms due to pressure on, or destruction of, nerve tracts. Such are headache, a localised paralysis, or some loss of sensation. Sometimes convulsive seizures take place.

LOCOMOTOR ATAXIA.

This is a disease of the nervous system caused by syphilis. It manifests itself in middle life some years after the original infection. Since the disease involves the columns of sensory fibres in the cord, sensation in the feet is affected and the patient is liable to stagger and fall, especially when the eyes are closed and he is deprived of the aid of vision in co-ordinating his movements. Other symptoms are severe darting pains (so-called "lightning pains") in the legs, and the "crises." The latter term is applied to conditions of severe pain in organs with disturbance of their functions, which occur in this disease. They may take the form of pains in the stomach with vomiting, or in the rectum with diarrhœa. The physical signs generally met with are loss of the knee-jerk and ankle-jerk and absence of the normal contraction of the pupil when exposed to light. Failure of vision may also occur from atrophy of the optic nerve.

Some cases show swellings of the larger joints which may require special nursing care. These are called Charcot's joints after the French physician who first described them.

Mental symptoms make their appearance as the disease advances. They usually take the form of a progressive dementia, sometimes with a striking loss of memory.

GENERAL PARALYSIS OF THE INSANE.

Like the disease last described, this is due to the micro-organism of syphilis. In the former it is the spinal cord that is

chiefly attacked, in the latter the brain, but no sharp line can be drawn between the two, and cases of general paralysis are seen which have commenced with, and still show many of the signs and symptoms of, locomotor ataxia. In both the micro-organism of syphilis has been found, and in both the cerebro-spinal fluid gives positive results to the tests for syphilis.

General paralysis is one of the diseases in which the mental symptoms are associated with readily demonstrated disease changes in brain substance.

Sex and Age.—General paralysis occurs more frequently in men than in women, in the proportion of 4 to 1. About 11 per cent. of the male patients admitted into mental hospitals in England and Wales are suffering from this disease, but in the case of the females the proportion is only 1·5 per cent. It is one of the most common causes of death amongst the male patients, and no less than a quarter of the male deaths are so caused (Board of Control figures for 1920).

General paralysis attacks persons in the prime of life, the great majority being between thirty-five and fifty years of age. It occurs very rarely in young people, but occasionally is met with even in children; it should be noted that in these early cases there is almost always evidence of congenital syphilis.

Stages and Duration.—It is convenient to describe general paralysis as occurring in three stages: the first consisting of a period of onset and mental disturbance that precedes the appearance of convulsions; the second an intermediate stage of mental enfeeblement and bodily weakness; the third a bedridden stage of general helplessness and vacancy of mind. It must be clearly understood that these stages are not sharply defined. A fit may be the first sign observed, or convulsions may be deferred until late in the disease, or may even be absent throughout.

No definite duration can be assigned. It may be rapidly fatal or, in a certain few cases, it may last for many years. Most of the cases die in two or three years.

Types of General Paralysis.—Three types of case are met with, and the mental symptoms are extremely diverse in each:

1. Cases with excitement and exaltation;
2. Cases with depression;
3. Cases with mental enfeeblement without any special emotional change.

1. General Paralysis with Excitement.

First Stage.—As a general rule, the earliest mental symptoms observed are a subtle change in character, accompanied by instability of purpose, irritability, restless activity of mind, and a feeling of well-being and increased capacity for work. There is lessened self-control, and judgment is markedly impaired. As a consequence of this the man becomes extravagant, is apt to speculate, believes he can rapidly amass a fortune, and at the same time is mentally very active, making all kinds of appointments, rushing about the country, and developing schemes and plans. Very probably there is also a lack of moral control, irregular living, or alcoholic intemperance; or possibly some gross form of self-indulgence; or, again, misconduct which greatly distresses his relatives, who cannot understand this deterioration of character. As the disease progresses, the patient neglects the most obvious duties, is unable to conduct his business properly, and entertains wild schemes for the future. At last some extravagant or outrageous act alarms his friends; a medical man is consulted, the nature of the malady recognised, and the patient is placed under care. When he first comes under observation he is usually well nourished, but in all probability worn with excitement and want of sleep. His general conduct at once shows his excitability, and he probably rushes hither and thither, talking to everyone he meets. The extreme state of exaltation is evident directly he speaks, and he will probably expound at once some grandiose idea. He cannot, however, give his attention to any subject for long; it is easy to divert his train of thought, and his conversation is disconnected and rambling.

Although he probably knows where he is, his memory is defective, and when asked what he has been doing lately, he can only give a garbled, incoherent account. Hallucinations may exist, but a prominent feature is the presence of delusions of grandeur. The patient's absurdly extravagant beliefs are remarkable; he is the "King of the Universe," possesses millions upon millions, is stronger than Samson, is the greatest poet on earth, and not unlikely is all of these at once. Generally, in every department of life, he is far in advance of anyone that has ever been born.

It will be observed that marked enfeeblement of the mind is

associated with all these symptoms. There is no notion of any inconsistency in the extravagant statements, and no ability to understand their full meaning. The patient will say he possesses untold wealth, although he may be in debt and his family in want; he will declare himself able to beat anyone at billiards, when he cannot play at all; he will boast of his enormous strength, although muscular weakness is obviously creeping on him.

There is marked defect of self-control, and any idea presented to the mind is at once translated into action. He interferes with other patients, dictates what they should do, and will probably write a cheque for a million at the request of any stranger; he is boastful, quarrelsome, and subject to sudden outbursts of violence. The latter are sometimes extremely serious; the patient has no self-control; he has an inordinate notion of his strength, and may attack those about him with the utmost fury. As he is really in poor health and in bad condition, accidents easily occur. A peculiar instability of purpose is a noteworthy symptom of this disease. Patients may threaten violence, and positively declare that nothing will make them do what is proposed, and a few minutes later, especially if approached tactfully, will calmly give way as if they had never objected. For instance, a patient may be asked to go for a walk in the garden, but being busily occupied with some wild scheme he declines point-blank. If an attempt is made to take him out by force, there will probably be sudden violence, and possibly a serious struggle. But if, on the other hand, the patient is left undisturbed for a short time and then asked to explain his scheme outside in the fresh air, he will probably go out without a word. An experienced nurse who possesses ready wit and tact can usually manage general paralytics in a remarkably easy manner and avoid scenes of violence.

Although the majority of cases presenting excitement are of the kind described above, it must be remembered that the symptoms vary extremely in different cases. The excitement may be more intense, closely resembling acute mania, or there may be considerable mental confusion associated with it. But in almost all cases it is possible to detect distinct evidence of mental enfeeblement and a tendency to grandiose ideas.

Physical Signs.—Accompanying the mental derangement are a number of physical changes, indicating the progressive degenera-

tion of the nervous system. They can often be recognised as soon as the patient comes under observation.

The pupils may be irregular in outline, unequal, or insensitive to light. The tendon reflexes, such as the knee-jerk, may be exaggerated, absent, or different on the two sides. Tremors are present, often marked about the lips and tongue. The tremor of the latter is most evident when the patient is asked to protrude it. From the "in and out" movement, it has been called the "trombone tremor." Owing to weakness of the facial muscles the face has an expressionless aspect, and there is often some smoothing out of the usual folds running from the nose to the corners of the mouth.

The alteration in speech may be very noticeable. At first certain words are pronounced with difficulty, and the defect may easily be overlooked; but later there is a very characteristic hesitation and drawl, which can hardly be mistaken when once heard. In testing the speech, it is usual to select words which are naturally somewhat difficult to pronounce, such as "conflagration," "artillery," "Biblical commentator," in which the patient is found to misplace the consonants or omit syllables so that the word is slurred. The handwriting also suffers through the patient's inability properly to co-ordinate the muscles concerned in writing.

These early signs have little practical bearing on nursing, but the following nervous affections are more important. The gait is unsteady, there is a tendency to stumble or trip up over anything in the way. Difficulty in passing water, leading to retention, is common. This symptom sometimes occurs quite early in the course of the disease, and unless the nurse is alive to the possibility, there is danger from the rupture of an over-distended bladder.

Remissions.—The stage of excitement lasts a varying length of time—on an average, about twelve months. Sometimes it subsides rapidly, and the patient begins to improve for a time, both mentally and bodily. The remission may be so complete that he may be able to return to his friends, and remain wonderfully better for weeks, months, or, in some rare cases, for years. It will, however, be found that the physical signs of the disease do not disappear, although they also may improve for a time; and a certain amount of mental enfeeblement usually persists. During remissions patients often gain flesh and look wonderfully

better, and it is not surprising that relatives entertain hopes of complete recovery. But after an interval of uncertain duration these hopes are disappointed, the symptoms reappear, and the paralysis develops with greater rapidity.

In a very few exceptional cases the remissions are indefinitely prolonged, and the patient remains in a state of partial mental enfeeblement. Broadly speaking, however, there is no hope of recovery and, in spite of all that the physician and nurse can do, a fatal issue is inevitable.

Second Stage.—The second stage is frequently marked by the first fit, but in some cases the first stage insensibly passes into the second. Often the fit is preceded by a period of congestion, the face being red and the pulse full and bounding.

Fits.—The seizures in general paralysis may be indistinguishable from epileptic fits, but generally they are spread over a longer period, and the convulsions are less severe.

During the fit the patient is unconscious and there are marked convulsions, one side being usually more affected than the other. The convulsions rarely cease definitely, as in epilepsy, but as a rule some twitching of the muscles, or one-sided convulsion, lasts for a considerable time, and possibly, after a short interval, the fits are resumed. In this way a patient may have many hundred attacks consecutively. Sometimes the patient dies in the fit, but more commonly, after a series lasting perhaps twenty-four hours, the fits cease of their own accord. After the fits there is often marked weakness of the muscles affected, but in a few days this usually wears off.

Congestive Attacks.—In addition to definite fits, general paralytics are subject to attacks of loss of consciousness without any convulsions. These are called **congestive attacks.** Previous to these the patient is dull and stupid for a few hours; he is unable to take notice of things around, and his face may be flushed. Suddenly he is unconscious, and for a period lasting from some minutes to an hour or more lies in a helpless, lethargic condition, which slowly passes off.

Febrile Attacks.—General paralytics are subject to attacks of fever, which frequently precede a congestive attack or fit. A sudden rise of temperature is often the earliest sign of impending trouble.

During the second stage mental deterioration becomes more manifest, the delusions continue, there is increasing weakness of

the limbs, locomotion becomes unsteady, and there is increasing difficulty in passing water. The physical signs already mentioned are more distinct, the disorder of speech is now obvious to everyone, and the handwriting has greatly deteriorated and may be illegible. The gait becomes unsteady, and the patient soon requires assistance in walking.

Patients, however, often gain flesh during the second stage, and become apathetic and stupid. The course of the disease is usually variable, and there is frequently improvement for a time, when another fit or series of fits occurs, after which the patient is found to have greatly deteriorated. The progress downhill is usually undulating; for a time there is, perhaps, a slight rise in mental and bodily vigour, but this is followed by a rapid decline until the third stage of the disease is reached.

Third Stage.—The patient is said to be in the third stage when he is entirely bed-ridden. By this time the mind has become extremely enfeebled, and little or no interest can be taken in anything. This stage continues in some cases until there is no sign of intelligence whatever, and the mind is in a state of utter vacuity. At the same time the muscular power progressively diminishes. There is wasting; often there is contracture of the limbs, so that the patient lies curled up in bed, unable to move hand or foot. During the third stage the evacuations are passed involuntarily, the urine dribbles away continuously, and unless the greatest care is taken, bed sores will occur.

2. General Paralysis with Symptoms of Depression.

In some cases instead of excitement and delusions of grandeur there are depression, resistiveness, and delusions of unworthiness or other depressing ideas. These may be extreme in character. Hypochondriacal ideas associated with great irritability are frequent. In some cases there are definite delusions of persecution, and the patient complains bitterly of his detention and treatment. In other respects the disease runs a similar course to that already described, except that it is more protracted and remissions less frequently occur.

3. General Paralysis without Excitement or Depression.

Cases of general paralysis occur which show no marked emotional disturbance, but which from the first exhibit mental enfeeblement. In these cases the patient is at first tired, easily fatigued, apathetic, dull, and unable to do his work. After an interval a fit calls attention to the nature of the disease.

Many such patients are not placed under care in mental hospitals, as the mental symptoms are not troublesome, and the patient can be nursed at home.

The physical signs and progressive decline are similar to those occurring in the types already mentioned.

Nursing and Management of General Paralysis.

Only a few special points will be mentioned here.

Violence.—General paralytics in the early stage are often difficult to control and may be very violent. In no class of patients are injuries more liable to occur. If the use of force cannot possibly be avoided, ample assistance must be at hand.

Quarrelsomeness.—Careful supervision is needed to prevent them from quarrelling with other patients, who are readily provoked by their dictatorial, extravagant conversation.

Liability to Fits.—Constant observation is necessary lest a fit should occur when the patient is unattended.

Fragile Bones.—The bones in some cases become extremely fragile, owing to the altered nutrition. Hence in lifting or handling a patient the utmost care must be exercised.

Retention of Urine.—This is common, and may occur quite early in the disease. The nurse should always know when urine was last voided, and if it is unduly retained, special report should be made. The fact that urine is dribbling away constantly is no safeguard; it may be the overflow of a distended bladder.

The *bowels* also are apt to get overloaded, and enemata may be necessary.

Choking.—General paralytics are often greedy; but they often swallow with difficulty, and the utmost care must be taken both in giving them their food and preventing them from appropriating the food of other patients.

Bed Sores.—Bed sores have already been mentioned. It is usually desirable to allow general paralytics up for at least part of the day until their advancing weakness renders it im-

possible; the change from a horizontal position greatly lessens the risk of bed sores.

Fever.—Watch for unexpected rises of temperature.

Death in general paralysis may occur in the course of the fits, or from pneumonia, bronchitis, diarrhœa, or some other intercurrent disease; or it may be due to the disease in the brain extending to the nervous centres which control the vital functions, so that the heart fails or respiration ceases, or the temperature rises to a point incompatible with life.

Such is the course of general paralysis in its typical form; but it must be remembered that the destruction of nervous tissue does not always begin in the same areas of the brain; and its course varies in different cases, so that an immense variety of symptoms may occur.

On examination of the brain after death it is found that the meninges are thickened. The dura mater is often adherent to the inner side of the skull, the piarachnoid to the surface of the brain, which it tears when attempts are made to detach it. The convolutions are wasted, especially in the frontal region, the ventricles dilated, and their delicate lining membrane is thickened so that it presents a finely granular appearance.

PARALYSIS AGITANS (SHAKING PALSY).

A disease of the central nervous system, characterised by tremor, weakness, and rigidity of muscles. It is gradual in its onset and progressive. The tremors usually begin in the hand and arm, but sometimes in the head, and make their appearance before the weakness and rigidity are manifest. They do not continue during sleep, and at first the patient can control them.

As the disease advances efforts at control increase the tremors. In pronounced cases there is a characteristic attitude of the hand; the fingers are flexed at the metacarpo-phalangeal joints and extended at the others, and the tremors of the hand resemble the movements made by rolling pills between the finger and thumb.

With increasing weakness and rigidity of the muscles there is produced a characteristic facial appearance and attitude; the face is expressionless and mask-like (Parkinson's mask), the head and body are bowed, and the limbs slightly flexed at the hip

and knee, and the patient's steps are short, hurried, and shuffling (the festinant gait).

It is usually associated with some mental deterioration, dulness, and loss of memory, depression, apprehension, and suspicion.

DISSEMINATED SCLEROSIS.

This is a disease of the brain and spinal cord, consisting of scattered patches of degeneration in the axons of both the upper and lower neurons. The disease occurs early in adult life, and is common to both sexes.

It is characterised by incoordination of the muscles, especially of the arms, which results in jerky uncontrolled movements when the patient tries to perform any act (intention tremor). There is progressive weakness in the limbs affected. Incoordination of the eye muscles is shown by jerky movements of the eyeballs (nystagmus).

The speech becomes affected; it is jerky and slow. The tendon reflexes are increased, and on tickling the outside of the sole of the foot the great toe is extended instead of flexed (Babinski's sign). The gait is ataxic, and there are progressive weakness and rigidity of the legs.

Bladder symptoms are common—difficulty in passing water and emptying the bladder or retention of urine may occur. Mental symptoms sooner or later make their appearance. The patient is mildly elated and unduly satisfied with his condition. The disease is usually fatal in about five or six years. It follows an irregular course, periods of improvement being followed by relapses; death is usually caused by some intercurrent disease.

CEREBRAL TUMOURS.

The signs and symptoms of the growth of a tumour in the brain vary, particularly in the earlier stages, with the part of the brain which is affected. Sooner or later, however, certain general symptoms appear as the result of the increased intracranial pressure. Headache is usually constant, and often paroxysmal; vomiting, which may not be preceded or accompanied by nausea, may be associated with the severe attacks of headache; the respiration and pulse-rate are decreased; there are defects of vision due to inflammation of the optic

nerves. The mind is enfeebled; there are dulness, apathy, loss of memory, and slowness of speech and movement.

General convulsions may occur, and in the later stages there is an increasing drowsiness which gradually deepens into coma.

DISEASES OF THE ENDOCRINE GLANDS.

It is now known that the internal secretions of the endocrine and other glands of the body are intimately associated with the functions of the involuntary nervous system and have a profound influence on mental processes. Thus it has been found that during the emotions of fear and anger the adrenal glands produce more of their secretion, and that this secretion helps in the production of the bodily reactions associated with those emotions. Again, some authorities consider that dementia præcox is connected with a decrease of the internal secretion of the testicles or ovaries.

The connection between the gland and the mental process is, in the present state of our knowledge, clearest in the case of the thyroid. In the diseases called **exophthalmic goitre, myxœdema** and **cretinism,** due to disordered function of the gland, mental symptoms may be prominent, and cases are met with in mental hospitals.

Descriptions of exophthalmic goitre and myxœdema will be found in Section VI. (p. 272). Cretinism is described in Section XIII. (p. 538).

SECTION XII

MENTAL NURSING IN INSTITUTIONS AND PRIVATE HOUSES

THE first section of this handbook was concerned mainly with general principles, and entered into details only when these had reference to matters which it was essential for the nurse to know at the outset of his career. By the time the present section comes to be studied he will have acquired a considerable amount of knowledge of both the theory and practice of his work. It is, therefore, less necessary to give reasons for everything that is here said, as he can supply them from his own experience. Before proceeding further, however, he is advised to read the first section of the handbook once more, if only to remind himself of the high ideal originally set before him.

The subject of the present section is mental nursing, as distinguished from the nursing of bodily disease. Naturally, the first thing to deal with is the mental nursing of a patient on admission.

RECEPTION OF NEW PATIENTS.

It will be obvious to every nurse who takes an interest in his patients that the first impressions received on their admission to the hospital are of very great importance. The fresh patient is usually agitated, and often distressed, and in a state of anxiety as to what is to happen to him. He probably resents his removal from home, he is bewildered by his new and strange surroundings, and possibly he finds it difficult to reconcile his presence in a hospital with the statements made to him to induce him to leave home without trouble. Such misleading statements are much to be regretted, as they create a feeling of resentment at being duped, which must be removed before much good can be done. It requires much tact and sympathy to reassure a new patient who is thus prejudiced at the outset; but every effort

should be made to inspire him with confidence as speedily as possible, and thus facilitate his further treatment.

Another important point to remember in connection with newly admitted patients is that their mental symptoms are to a great extent unknown. They may be suicidal, dangerous, or destructive, or present other features requiring immediate attention. They should therefore be carefully studied and tactfully encouraged to say what is in their minds, so that these special features may be soon recognised. In most hospitals, for this reason, new patients are placed in wards where particular attention can be paid to them. The nurse may rest assured that the medical officer at his visit will make full inquiry about new patients, and will expect to be supplied with the desired information. The nursing service in admission wards is, therefore, peculiarly instructive and interesting, and every effort should be made by the nurse, while there, to profit by this valuable opportunity.

All observant nurses, after even a short experience in a hospital, will be aware that a large number of patients suffer from physical as well as mental disease. When a new patient arrives, this should always be kept in mind. The first class of bodily diseases to be noted are those which are infectious. Their introduction into a hospital is a serious matter, and the fresh arrivals should be examined in a special room set apart for new cases, so that if an infectious disease should exist, it may be isolated, and not spread through the admission ward. The presence of skin rashes, sore throat, diarrhœa, fever, or any of the symptoms characteristic of infectious diseases should be searched for, and found to be absent before the patient mixes with others. In many cases vermin are present, and at once steps must be taken to disinfect the hair, skin, and clothing (in this connection, see Section VI., p. 234).

An inventory of the clothing and other possessions of every patient admitted should be made at once. Usually this list is made out in a duplicate book, one list being retained, and the other, with the articles enumerated, handed to the person who has accompanied the patient, as a rule, the relieving officer. His name is signed at the foot as having received them. When this is not done, and they are retained in the hospital, they are collected in a bundle, to which is attached the patient's name. Infectious clothing should be placed in a disinfectant or sent to

the laundry for disinfection, tied up in a sheet; while other articles, and all money and valuables, are safely put away by a responsible officer. Occasionally, the patient has some dangerous article in his possession, such as a knife, scissors, or matches, or a harmful drug. These should be securely locked away, and the matter reported to the medical officer, who may thus gain information as to the patient's mental state. The disposal of wedding-rings at times presents difficulties. Some women take them off and throw them away or put them in the fire, while others, already depressed, would become still more melancholy if their wedding-rings were removed. Much real hardship may also be caused by the thoughtless removal of trifling articles which are often greatly valued by the patient. Each case must be judged by itself, and in a doubtful one the medical officer will decide.

For rate-paid patients, a complete set of clean clothing is usually provided, to take the place of their own. Care should be taken, especially with boots and slippers, to see that they fit with reasonable comfort.

Immediately after admission, careful observation should be directed to any signs of injury or deformity. This is important, since if there is an injury it must be treated at once. Moreover, if the patient is resistive, the presence of an injury would make it undesirable to remove his clothing except under medical supervision. In many hospitals it is the usual practice to give the person responsible for bringing the patient, a medical certificate stating his general bodily condition, with particulars of any special disease from which he may be suffering and any marks of injury present. Should the patient die soon after, with any such marks on him, it is most important that their presence should have been recorded on his admission. It relieves the hospital officers of the responsibility of having to account for their existence. The patients most likely to have injuries when admitted are those who have been excited, resistive, or violent, or who have made an attempt to commit suicide. These should be specially examined for any fracture, bruise, or sprain.

Artificial teeth should be removed, at least until the medical officer's sanction for their use has been obtained. They should always be examined, and in most cases it will be found that they need to be cleaned. This reason can be given for taking them away if any objection be made. It is also desirable to allow of a satisfactory examination of the state of any remaining teeth.

The patient, having been undressed, examined by the nurse, and put to bed, is now ready for the medical officer's examination. Before his arrival the temperature should have been taken, and the other duties above mentioned completed. Usually, the first thing the doctor orders is a cleansing bath, and this should never be given without his permission. In many cases—where, for example, there is heart disease or great exhaustion—an ordinary bath might be dangerous, and the doctor is the only one who can judge in this connection. But if the nurse is instructed to give the patient a warm bath, this duty must be carried out expeditiously, and, at the same time, with great care. The patient's mental state is not thoroughly known, and no risks must be run at this early stage of his residence. He must never be left alone in the bath-room.

BATHING.

In connection with the bathing of patients, whether newly admitted or not, different hospitals generally have rules of their own, which the nurse must carry out. There are, however, certain general precautions which may be mentioned here.

(1) For an ordinary warm bath, the cold water should be turned on first, and warm water added until the proper temperature is reached. In modern baths the warm and cold water are mixed before delivery.

(2) No patient should be allowed to enter the bath until its temperature has been ascertained by the thermometer.

(3) The temperature of an ordinary warm bath is about that of the body—98·4° F. up to 100° F.

(4) A convenient way of measuring the depth is by having a mark on the bath thermometer. The level to which the water should rise should cover the thighs of the average patient immersed. Generally the depth needed will be about 6 inches, and the amount of water from 10 to 12 gallons.

(5) Special care is required in bathing paralysed, epileptic, and excited patients. A sufficient number of nurses must be present to do this without risk to the patient.

(6) No patient's head should be immersed against his will.

(7) The bathing should not be too hurried, and special pains should be taken to clean the head, hands, feet, ears, armpits, and nates. This is specially necessary in the case of newly admitted

patients. Many of them do not bathe regularly, or their work is dirty. A bath brush is generally used, but it should not be too hard, as the skin of many people is tender, especially when moist, and a hard brush may cause bleeding. In these cases, or where the skin is already fairly clean, a cotton glove may be used for most of the body, and the brush used only for the hands and feet. When patients are specially dirty a second supply of fresh water may be required.

(8) After the bath the patient should be thoroughly and rapidly dried with a fresh, clean towel.

(9) Fresh bath-water should be prepared for each patient.

(10) The bath key should never be left on the tap, but kept in the nurse's possession.

(11) After the newly admitted patient is bathed and dried he is put to bed.

During the bathing, attention should be paid to any skin eruptions, bruises, or sores (including bed sores), which might not have been visible when the skin was dirty. Pain, especially on respiration, swelling or tenderness of any part, rupture, hæmorrhoids, or distended bladder should be looked for, and any points noticed should be recorded. The nails of the hands and feet should be attended to immediately after the bath, as they are then more easily cut. It should be remembered that many people, especially when old, dread having a bath, while some are convinced that bathing is dangerous, and liable to induce colds. Their fears or foolish ideas should be tactfully overcome by explaining the feeling of refreshment and invigoration after a bath, which will remove the dust of their journey, and that it is a rule of the hospital.

For the first few days, at least, observations and records of various bodily functions should be made. These include the patient's appetite, taking of food, the movement of the bowels, the passage of urine, and, in women, the menstrual function. In the charts in use in all hospitals there are spaces for entering these important facts.

INVESTIGATION OF THE MENTAL STATE.

This subject has been fully discussed in Section X., and need not be enlarged upon here. Sometimes the nurse is shown the order of admission and the statement of the doctor who certifies

the patient as of unsound mind, and thus obtains much light on the nature of the disorder and any special features, such as attempts at violence. In addition, when the medical officer examines the patient, the nurse should note the questions put and the answers given, unless, as is sometimes the case, the patient requests a private interview with the doctor, and the nurse retires.

In the course of attending to the patient, in the various ways just described, opportunities of conversation will occur of which a skilled nurse is sure to take advantage; and by the time his duties are performed, and the instructions of the medical officer are carried out, he will have a good idea of the kind of case under his charge.

When a patient is admitted late at night, when the ordinary meals are over, it is usually desirable to give him some warm food before he settles down for the night. This shows him that an interest is felt in his welfare, and it also promotes sound sleep.

Case-Taking.—In most hospitals a case-taking form is used by the medical officer which the nurse may take as a guide. On this are entered the patient's emotional state, memory, powers of attention, sensation, muscular power, and so on. The headings there given will direct the nurse along the right lines of investigation, and the results should be carefully noted. The information thus gained will be of great service and interest to the nurse, and also of great value to the medical officer. This procedure is specially valuable in a private house, where the medical attendant's visits are less regular than in a hospital, and his opportunities of studying his patient are less ample and varied. He expects a capable nurse to supply these deficiencies.

MANAGEMENT OF BODILY HEALTH.

To maintain good health in a person free from organic disease is comparatively easy. A regular life, and food, sleep, and exercise, varying in amount with individual needs and capacities, should secure physical fitness. Every sensible person observes the effect on himself of variations in these amounts, and learns to keep to what he finds suitable, but patients suffering from mental disorders may require much supervision in these matters.

No hard-and-fast rule can be laid down. The requirements of the individual should be closely studied. In the summer most

people require less meat, and experience a slight loss in weight. In the winter, and when there is much muscular exercise, more food is taken and digested, and the weight usually increases. Sleep, again, is usually sounder and longer in winter, and is prolonged by hard exercise.

When the bodily health is impaired from disease the whole situation is different. This question is dealt with in Section VI., and we need only remind the reader that when a patient is known to be subject to any special disease, the management of his bodily health requires attention in this special direction.

MANAGEMENT WITH REFERENCE TO MENTAL CONDITION.

In Sections I. and XI. will be found many useful directions for the management of patients from the mental point of view. There are, however, some other aspects of this matter which deserve attention.

Occupation.—The well-known proverb about idle hands has no better illustration than in a mental hospital. Not only may tangible mischief be done by them, but they have a bad mental effect. Most mental patients suffer from a concentration of their attention on themselves, or have not the wit to employ their energies in useful directions. In both cases wisely directed work often proves their salvation. Every effort should therefore be made to interest them in the daily routine work which is necessary in every ward. The work given them should, of course, be useful, otherwise it degenerates into a task, which is looked on by the patient as a sort of punishment, and focusses his attention still more upon himself. In all mental hospitals there are many departments besides the ward in which very useful help may be given. Skilled craftsmen can follow their trade in the workshops, where the various needs of the hospital are supplied and repairs effected. Tailoring, joinery, upholstery, engineering, and many other trades can be practised and the craftsman's skill maintained. There are also the farm and garden for those whose special occupation is not represented in the shops. Here, work has the advantage of being in the open air, it often does not require much training or, as a rule, the use of sharp tools. Work is also useful in testing the degree of a patient's recovery. If he has regained his old skill, and makes a good use of his working time, one may generally feel confident that he is better than when

he was admitted. There are, however, exceptions which will occur to the experienced nurse.

For women also there are interesting occupations, besides ward work. Mending, darning, and repairing, and the kitchen, the laundry, and the sewing-room will provide work for the majority. It is a good feature in a hospital report to find that the percentage of patients employed daily in useful work is high.

Considerable difficulty may be found in inducing private patients to engage in work, especially as many of them regard ordinary work as menial. In such a case, efforts must be made to discover the patient's inclination and aptitudes. Almost any occupation in which he will engage is of mental use to him, and may lead to something better later on. Allotments in the garden, where the spirit of imitation or rivalry can be called into play, art and craft work of all kinds, sketching, fancy work, needlework, and music are often of the greatest use in diverting the attention of patients from themselves. In many hospitals exhibitions of such work reveal the existence of very varied talents, and also rouse the interest of those who have not themselves contributed.

Recreation and Amusement.—But however useful and interesting the work, patients in a mental hospital would find it a dull place were no provision made for their entertainment. The evenings, especially in winter, would pass heavily and slowly with nothing to do. Various simple games, such as dominoes, draughts, cards, bagatelle, or billiards, should be provided in every ward, and the nurses should join freely in them. This is good both for nurses and patients. Many of the latter, who are normally apathetic, and show little interest in or aptitude for skilled work, will take part in a game, and be much the better for it. Music also appeals in a wonderful way to some of them, and in many wards a piano or gramophone or other musical instrument will afford great pleasure.

Associated entertainments are also much appreciated, especially by chronic patients who have no other opportunity to indulge their natural wish for amusements. Dances, concerts, plays, kinema shows and similar performances are usually arranged to occupy at least one night every week. Cricket and football matches are also watched with keen appreciation, and often taken part in, by the patients.

Country walks can be taken by parties of patients in charge

of nurses. It is, however, desirable that the roads used should be quiet, not frequented by motor-cars or cycles, and not passing through villages. Suicidal patients have attempted to throw themselves in front of a car on a country road, so that discretion is required as to who should be of the party. Well-known runaways, of course, must not be included. The curiosity of country villagers is also a source of annoyance to some patients. They complain that they are stared at and laughed at, and that consequently walks give no pleasure. But under suitable conditions there is no doubt that a country walk over comparatively unfamiliar ground is much more enjoyed than walks in the hospital estate, where the paths have been traversed so often that they present no novelty.

Excursions to longer distances, with similar precautions, can be taken in fine weather. They require more elaborate preparations, but they are even more enjoyable, and do much good in relieving the monotony which threatens the life of every institution, especially of the mental hospital.

Parole.—For various reasons some mental patients require constant supervision. But to many chronic cases, and to most convalescents, this continual attention is not only irksome, but is positively harmful. It conduces to their happiness and strengthens their power of self-control to give them as much freedom as possible.

Such patients may be put on parole—that is, on their word of honour—not to abuse this privilege. They promise not to escape, and to obey the general rules of the hospital and any other special rules laid down for them. They are placed in wards or in separate villas, the doors of which are not constantly locked, and they can walk in the grounds, if not beyond, at stated hours, when their daily duties are over. Many irritable, discontented patients may by this means be converted into quiet and sociable members of the community in which they have to live. Convalescents can also be tested as to the degree of their recovery of their powers of self-guidance. When under restriction their powers of controlling themselves have no scope, and only a freer life can fully test these. If they stand the test successfully they are more likely to go on well when they return home. In not a few instances, however, the system of parole reveals latent mental disturbance otherwise not suspected, so that it is not only a pleasant, but a useful feature of mental hospitals.

Patients on parole, at least at first, require careful consideration. A slight return of previous symptoms, or an inclination to abuse the privileges of parole, should be at once reported. The chances of doing harm which greater freedom gives are numerous, and must be carefully guarded against. The observant nurse will here have an opportunity of showing his reliability.

SLEEP AND INSOMNIA.

The nursing of patients at night is a most important matter, since the good results of treatment during the day may be largely nullified by the absence of proper treatment at night, when that is needed. In both physical and mental illness the normal condition of sleep is departed from, and in some cases the symptoms requiring a nurse's attention may only be present, or may be aggravated, at night. Epileptic fits, for instance, often occur then, and suicidal tendencies are especially common at night or in the early morning.

The question of night nursing involves a somewhat lengthy discussion of sleeplessness or insomnia.

We may mention three of the main influences which conduce to **normal sleep.** These are:

1. *Muscular Relaxation.*—Generally, when we wish to sleep, we lie in bed. This allows the muscles to relax, which they do more and more completely as we sink to sleep. In sleep, all voluntary tension ceases, and no demand is made upon the nervous energy. Anything which prevents this perfect relaxation makes sleep more difficult.

2. *Mental Relaxation.*—Only as the flow of conscious thought is subdued do we gradually fall asleep. But it is less easy to secure complete mental than complete muscular relaxation, and this is one of the difficulties which nurses have to confront.

3. *Absence of Unusual Sensory Stimuli.*—Normally, when we go to bed, the light is put out, sounds are subdued, and sensations are reduced to the minimum. We can, however, acquire the habit of sleeping when strong sensory impressions are present if we are accustomed to them, and may even be disturbed by their absence. The nurse should, therefore, note any exceptional condition, whether positive or negative, that may arouse new sensations, and thus interfere with sleep.

Speaking generally, anything that increases the activity of

the cerebral circulation tends to produce sleeplessness, while anything that lessens its activity without disturbing the general functions of the body favours sleep. Such changes depend upon various factors, some of which, like heart disease, directly affect the circulation, while others, such as mental excitement, act upon it through the nervous system.

We may discuss the various causes of **sleeplessness** under two heads—viz., those which are external to the body and those which are internal.

The *external causes* are chiefly unaccustomed or uncomfortable surroundings. In healthy subjects these may be of small importance, and a person who is tired will sleep readily, in spite of much discomfort; but with invalids, anything that disturbs the ordinary routine tends to produce sleeplessness. Thus, a strange room, unusual noises, a hard, lumpy mattress, a pillow that is too high or too low, or unduly heavy bedclothes may render sleep impossible. A common cause of insomnia is bad ventilation of the bedroom, producing a sense of oppression. Again, elderly people, or those unable to take exercise, may find it difficult to keep warm even with plenty of blankets, and are restless unless a fire or a hot-water bottle is provided.

Internal causes are more important and more difficult to remedy. These are both physical and mental. Alterations in bodily health, especially those accompanied by pain, often occasion sleeplessness. It is also present in almost all febrile states, and is a very distressing symptom in many forms of heart disease and respiratory disorders. Moreover, minor disturbances of health, fatigue, and the effect of drugs or stimulants, frequently prevent sleep.

Again, sleeplessness may be owing to mental causes—excitement, anxiety, and other distracting conditions. Sometimes it arises largely from the habit of worrying and thinking over the events of the day. In such cases, however, there is generally also present some bodily disturbance, but for which the patient would succeed in dismissing the troubles of life at bedtime.

Once more, insomnia may result from long-standing neglect of the laws of health, such as late hours, or excessive work carried on in spite of weariness, often under the stimulus of strong tea or coffee.

The habit of sleeping, once lost, is difficult to re-establish.

In almost all acute cases of mental disorder the patients sleep

very badly, and sometimes in delirium they do not sleep at all, and rapidly become so much exhausted that life is imperilled. In maniacal excitement there are short periods of sleep, but its total amount is very deficient. In melancholia, also, sleeplessness is a constant and distressing symptom. It is frequently found that previous to the attack of mental disorder the patient has been sleepless for a long time, and generally one of the earliest signs of convalescence is the return of ability to sleep.

Thus, the connection between sleeplessness and mental disease is intimate, and it is of great importance to observe and report any disturbance of sleep. Not only should its amount be noted, but also its character, whether sound or light, continuous or interrupted. By careful observation the nurse may discover some factor which may throw light upon the cause of sleeplessness and materially assist the physician in his treatment. Sometimes, for example, a mental patient may be in pain, and yet refuse to complain of it. It is for the nurse to find out the presence and the cause of such pain, and then to alleviate it by any suitable method.

Treatment and Management.—The nurse's duties in the treatment of the more severe cases of sleeplessness are very important. Good nursing and management are generally of greater value than the administration of drugs. There is scope for much resource on the part of the night nurse in the application of remedial measures.

Personal influence is also an important factor. A nurse who is considerate without being fussy, who anticipates the needs of a patient without asking questions, whose demeanour is calm and who goes about the necessary duties quietly and efficiently, readily commands confidence. This, in some cases, is half the battle; the patient's mind is set at rest, and consequently the remedies applied are successful. It is easy to understand that anything which disturbs or irritates him, whether it be a noisy footfall, a flapping blind, a loud ticking clock, the careless slamming of the door, or needless conversation within his hearing, may quite mar the effect of the most appropriate treatment.

The first concern in a case of sleeplessness is the bodily condition of the patient. In particular, constipation should be attended to, and in acute cases the possibility of retention of urine should be considered. The nurse should also take the patient's temperature during the night to ascertain whether there

is fever, on the one hand, or deficient bodily heat on the other. If he is sleeping, care must be taken not to awaken him.

Fresh air and exercise are of the utmost importance. In many cases the patient should be out of doors as long as possible. Frequently, when he is confined to his bed, it may be moved outside, so that he may be in the open air all day.

Much may be done to encourage sleep by attention to the ventilation of the room, the shading of lights, and in general the removal of all disturbing influences. The evening meal should be light and easily digested, the surroundings should be unexciting, and bedtime regular. In particular, the bed and bedclothing must be carefully considered. The sheets should be smooth, and the blankets neither too many nor too few. When there is defective circulation or a tendency to cold feet, hot-water bottles are an important aid. Most people sleep best alone and in a dark room, but many insane patients can only sleep well in company with others. Not a few, especially those with terrifying delusions or hallucinations, dread the dark and prefer a dormitory, in which a night nurse is constantly on duty, to the privacy of a single room.

Sometimes patients who are not only sleepless but noisy may be induced to settle down by the advantages which a dormitory offers. A case in point will illustrate this. A female patient was transferred to a new hospital. She had a bad reputation for being noisy at night, which she completely justified on arrival. A strenuous effort was made to break this bad habit by placing her in a dormitory with a nurse on duty. At first she disturbed the other patients so much that this arrangement could not be continued, but the short experience of it was of great service, as she found that, in a single room, she was not so warm or comfortable, did not get milk and food during the night, was left in the dark, and could not receive so much attention. She promised to be quiet if allowed to return to the dormitory, and this was permitted. She had several relapses, but finally she became quiet at night, and is now a most useful kitchen worker, whereas formerly she spent her days in scolding or in sleeping. She is much happier herself, and much less of an annoyance to other patients. It may be said that, generally speaking, only cases of delirium with noisiness fail to respond to this means of cure. Whenever a patient shows the least tendency to persistent noisiness at night he should be put in an

observation dormitory, and this rule holds good of patients whose habits at night are faulty or destructive.

Food.—Many persons sleep better if a light meal, such as bread and milk, is taken just before retiring to bed, but more frequently food is needed most in the early hours of the morning. Patients often sleep fairly well in the early part of the night, but waken and remain awake at two or three a.m. In such cases a cup of hot milk, with bread-and-butter or a biscuit, may be followed by several hours' sleep. It has been found that a draught of hot water taken on going to bed sometimes promotes sleep, and this remedy is open to less objection than the " night-cap " of spirits so frequently recommended.

Often, before insomnia can be banished, the diet of a patient must be revised, and his habits in relation to stimulants entirely changed.

Baths.—Baths are often of considerable service in the treatment of sleeplessness. In cases of extreme irritability the warm or hot bath may be prescribed immediately before bedtime, but sometimes either appears to produce increased restlessness; and then recourse may be had to tepid or cold douches, or cold baths followed by friction. In febrile cases, tepid sponging of the whole body, first the head and neck, then the arms, then the trunk and lower limbs, is of great service, not only in reducing the temperature, but in soothing the patient and promoting sleep.

Massage.—General massage late in the evening is found to induce sleep in some cases, but in others it appears useless, if not actually a hindrance. Occasionally partial massage of the limbs, such as firm pressure and kneading in the direction of the venous circulation, is valuable, especially in cases which are due to fatigue, or in which restlessness is a marked feature. Other special procedures may be adopted, such as gentle downward stroking from the occiput to the side of the neck, and massage of the neck and upper part of the spinal column. Deep kneading in the deltoid region is said to have a sedative influence. Gentle stroking of the hair, or brushing it for a prolonged period in a uniform way, is also recommended.

Drugs.—A large number of drugs may be prescribed for the treatment of sleeplessness. Some of them are given chiefly to relieve pain, others to calm excitement, whilst another class, termed " hypnotics," are used simply to produce sleep.

Dangers of Sedatives.—A word of warning as regards the use of

sedatives will not be out of place. Sleep is not merely a state of unconsciousness, it is a period of repair, which is a necessary vital process. Many drugs, while dulling mental activity, at the same time retard that process, and diminish the power of regeneration. In addition to their effects upon the nervous system they exert secondary effects, especially upon the organs and the functions concerned in nutrition. Hence the lassitude and malaise which are so often experienced after taking a sedative. Moreover, the drug habit is only too soon established. The downward path is easy, but the return is a veritable labour. A patient takes more and more of a drug to obtain the desired result, until the mere magnitude of the dose becomes a serious danger. He creates a costly and unnatural necessity, upon which his comfort in life is absolutely dependent; and the evil develops till finally, with every faculty weakened, he sinks into a mental, moral, and physical wreck.

The whole problem of the treatment of sleeplessness should be regarded as one of general hygiene and nursing, not as one largely concerned with the prescription of drugs.

The lavish use of sedatives is really evidence of a low standard of nursing and of a general régime that is unfavourable to mental health. Of course, there are many cases in which it is necessary to have recourse to drugs, to insure sleep, or even moderate quietness, on the part of the patient; but, broadly speaking, the more intelligent and conscientious the nursing, the fewer the drugs required. Probably no other department of nursing offers such a field as this for individuals to show their worth and benefit their patients. It is far easier to ask the doctor to order a sleeping draught than patiently to adopt the various suggestions given above and to devise numberless other plans which, though apparently trivial, may just make all the difference, and bring about the desired end. But the nurse who chooses the latter alternative will gradually attain an astonishing degree of success, and will not be found wanting under what is, perhaps, one of the greatest tests of efficiency.

REMOVAL AND TRANSFER OF PATIENTS.

There are certain dangers attending the removal of patients from one institution to another, chief among which are attempts at suicide and escape. The safest plan to prevent these efforts

from succeeding is to carry out the rules already laid down for the effective care of cases in the hospital (p. 21). The chief additional precaution is to see that there are a sufficient number of nurses accompanying the patient to insure that he is under continuous direct observation. The getting of tickets or food, the use of the lavatory, and the other necessary incidents of travel, can then be seen to without risk. A special compartment in a train can usually be secured by a word to the station-master or guard.

When a patient is removed, there are generally legal papers connected with his transfer. The nurse in charge should see that he has these papers before leaving, should take care of them on the journey, and hand them over with the patient when his destination is reached.

It is also very desirable that the patient should be bathed and dressed in clean neat clothing before removal. Opportunity is thus given to ascertain the presence of any marks, injuries, or bruises.

Before leaving, the nurse should ask the medical officer whether he has any special instructions for the journey. This is particularly necessary when the nurse is not well acquainted with the patient and his symptoms. He should also see that he has sufficient money for his requirements.

NURSING IN PRIVATE HOUSES.

There is no doubt whatever that nursing a mental case in a private house is attended by special difficulties and dangers. In fact, when these pass a certain limit removal to a hospital is necessary. Before taking charge of the patient, the nurse should make a point of seeing the doctor or relatives in order to ascertain the nature and intensity of the mental symptoms, and to see that the arrangements in the rooms are suitable. The choice of rooms seldom rests with the nurse, but if possible, they should all be on the ground floor, as stairs often present grave risks or temptations. Their furnishing should be as simple as possible, without being too bare and uninviting. In special cases the windows should be stopped both top and bottom, so that they cannot be made to open more than 5 inches. The locks should be inspected, the keys removed, and bolts taken from the inside of water-closet doors. All sharp and dangerous utensils which

might be a source of risk to the patient or nurse should be taken away.

When the case is actively suicidal these precautions are imperative. Half-hearted measures avail little. In addition, the nurse must see that blunt knives and forks are supplied for meals, both for himself and the patient, that razors are carefully locked away, and that all keys are removed from drawer-locks.

For cases of excitement and noisiness the rooms should be practically cleared of everything except the necessary furniture. Special attention should be given to the removal of fire-irons, as these are very dangerous weapons. The rooms which the patient occupies should be as far as possible isolated, so that other persons in the house may not be disturbed. It is usually found that an excited patient causes more disturbance than a melancholic, and that an isolated house in the country is more suitable for such a case.

In cases of insomnia it is unwise, as a rule, for the patient to remain in bed in the morning, though it may then be possible for him to get some sleep. Perhaps a radical alteration in his manner of living, or a complete change of scene, will be found necessary.

The drawbacks attending the nursing of cases in a private house are numerous, but the following may be specially mentioned: (1) Less help can be obtained from fellow-nurses or doctors, and therefore more forethought and observation of the patient's symptoms, more resource, and more self-command, are necessary on the part of the nurse. (2) The actual bodily risks are far more serious. (3) The difficulties of getting the patient to take food, medicines, and exercise are much greater, and he will probably suffer from the need of these, unless the nurse has unlimited powers of tact and persuasion. A patient is usually much harder to control, and more apt to resist interference with his liberty in his own house than anywhere else. (4) The relatives and friends of the patients will often be suspicious, fussy, or obstructive, or they may lose their heads from fear. Therefore a nurse must be patient, but firm with them, and, above all things, must get the doctor in attendance to give explicit orders, and to take the responsibility for the treatment adopted. It is often wise for a doctor to suggest that the patient should be left with his nurse, without too much interference and too many visits from relatives. (5) The labour is more exhausting,

possibly involving night and day work. A nurse should ask for assistance before his own strength and nerve give way. (6) It falls directly on the nurse, being by himself, to note whether the patient is suicidal, and to take measures for his being properly watched. No mental nurse should ever go to a case without thinking of the question of a suicidal tendency.

A few simple rules may be added: (1) As his position is isolated, the nurse should consult the doctor minutely as to treatment and contingencies, explain all his difficulties, and report any struggles and other unusual events. (2) The nurse will have to pay strict attention to the patient's personal appearance, as there will usually be no valet or maid to do this. He must see that his charge has a clean collar, that his hair is neatly brushed, that he is shaved daily if required, that his boots are cleaned, and that his clothing is clean, well brushed, and in good repair. (3) As the nurse is often alone with a case, he must see that his own health is maintained, and observe the ordinary hygienic rules about food, exercise, and sleep. Should he be out of sorts he should consult the doctor at once. Ill-health on the part of the nurse interferes with the proper discharge of his duties, and may be attended with risk to his patient. (4) When patients under private care are not certified as of unsound mind, limitation of their freedom has no legal authority. A nurse must not, therefore, interfere with such things as the correspondence of the patient or, speaking broadly, with his liberty, without the definite, and preferably written, instructions of the medical attendant or of a responsible relative. (5) In no case may a nurse, on his own responsibility, place a patient in seclusion, or use any kind of mechanical restraint, unless there is imminent danger of a serious accident and assistance cannot be obtained. When such methods are inevitable, they must be continued only while the danger remains, and the fact of their use, the reasons for them, and their duration must be reported with the least possible delay to the medical attendant. (6) As the nurse should be above suspicion, it is better for him not to take any alcoholic stimulants at all while engaged in private nursing.

Reports to Medical Attendant, and Keeping a Diary.—Finally, a good nurse can help the doctor greatly by keeping a daily record of (*a*) the food taken; (*b*) the action of the bowels; (*c*) the amount of sleep; (*d*) the length of time spent in the open air; (*e*) the temperature of the patient; (*f*) the chief mental

symptoms, with the changes that take place in them; (*g*) the patient's weight, if possible every week, if the case is long-continued. Such observations are very useful to the nurse himself, and give confidence to the patient's relatives. Besides the reports to the medical man, in many cases the nurse should keep a private diary in which to enter difficulties that have arisen and incidents that may throw light on his conduct in the case.

A good nurse is of incalculable value in the home treatment of a case of mental disease. Through his efficiency attacks may be cut short, infinite anxiety, accident, and risk avoided, suicides averted, and valuable minds restored to reason.

To have the care of a few cases in their own homes or in lodgings is very good for a nurse trained in a hospital. It makes him more watchful, more self-reliant, and more thoughtful, and he feels his own responsibility and the importance of his duties more keenly. He should be sure to keep his place as the patient's nurse, and never indulge in gossip or meddle with things outside his province. Most likely he will at first be looked on by those in the house with some suspicion or jealousy, therefore he must be very prudent in his conduct. But if he does his work well, and the case turns out satisfactorily, he will be rewarded by the gratitude and good-will of the patients and their relatives.

THE PRINCIPLES OF MENTAL NURSING.

The nurse has been given information about the treatment of physical ailments, including those which usually accompany mental disease. But there are also mental methods of treatment which are even more important, and which it should therefore be the special object of the mental nurse to know and practice.

It has already been pointed out that the routine details of mental hospital management differ from those of a general hospital, and some of the reasons for this have been given. The closing of a door, the locking of a cupboard, and the counting of knives and of patients have little significance in an ordinary hospital, but the mental nurse soon realises that the neglect of such details may mean the life or death of a patient, and that their careful observance is actually part of the treatment. This holds good of the ordered life of a mental hospital. Before

admission, most mental cases have not had the wisest management. Rest, food, and exercise have usually been regulated, not by the dictates of common sense, but by the whim of the patient. His delusions have often been humoured, and even encouraged, by mistaken methods of dealing with them, and he may have lacked the help which only a wisely sympathetic friend can give. Such a patient, if taken the right way by a good mental nurse, soon falls into the ways of the place and shows a marked improvement. How to acquire the right way is a difficult thing to teach, but an exceedingly important thing to learn. One great help is to remember that, in mental, even more than in physical disorders, one has to treat a patient and not a disease. An unkind word or an angry look, though always objectionable, may not do any serious harm to a patient suffering physically. But to a mental patient they may do grievous harm. To appreciate this danger and avoid it in practice needs sympathy and understanding. In all mental hospitals the nurse will soon discover that some of his colleagues have the knack of getting the best out of the patients. The novice should find out how it is done, and put his discoveries into practice. By doing so he is in truth applying very effective treatment to his patient.

It must be admitted that some cases of mental disease are incurable. The best that can then be done is to alleviate symptoms as they arise. In many other cases there is, as yet, no short cut to recovery. Treatment by drugs, and by surgical and other means, useful as they are in most maladies, have little direct influence on mental disease itself. Still, they materially assist Nature in overcoming it, and the nurse and doctor must use them with all the skill at their command and leave the rest to Nature.

Finally, there are cases in which the bodily element seems altogether negligible, and the question arises: Can anything definite be done on purely mental lines for the derangement from which the patient is suffering?

The problem of the directly curative treatment of insanity has been, broadly speaking, approached from two points of view. The first is that, however well in bodily health the patient may appear, he always suffers from some physical malady which must be remedied before there can be hope of mental recovery. In many cases the bodily disturbance is obvious enough, as in mental disorders arising in connection with childbirth, with

disorders of the ductless glands, and so forth. In other cases where it is not obvious, it has been assumed to be of the nature of a bacterial infection. On that assumption a very great deal of research has been undertaken, involving examination of the blood, the urine, and all the bodily secretions, and leading to vaccine and serum treatment, and other measures whose aim is to attack the bodily disorders. Though this view presents great difficulties, and is not perhaps so generally accepted as it used to be, it opens up hopeful lines of investigation and has some brilliant successes to its credit.

The second point of view, which is much in favour at the present time, is the psychological. Its advocates hold that mental symptoms are the direct result of wrong habits of thought, and can only be satisfactorily dealt with by treatment which is applied not to the patient's body, but directly to his mind—that is to say, by some form of **psycho-therapy.**

In another section of this book it has been shown how many mental symptoms can be explained along psychological lines, and although it is impossible to enter fully into the whole subject, there is clearly much to be said for the belief that the symptoms of many of our patients are caused by, and can only be cured through, the mind.

A summary of the methods of psycho-therapy may be of interest to the mental nurse. Its chief methods are three in number—namely, suggestion, persuasion, and psychological analysis.

Suggestion is defined as " the presenting to a patient of an idea which he accepts in the absence of any adequate logical ground for its acceptance."

It may be said that everybody is suggestible to a greater or less extent. Children are particularly so. When we make a child feel better by saying that " it does not hurt any more now " or by " kissing a place to make it well," we are employing suggestion pure and simple. When a patient says that he feels better for the visit of a doctor who has done nothing but speak a few pleasant words to him, or when he goes quietly to sleep after a drink of water which he has been told will certainly make him sleep, he is illustrating the power of suggestion. Suggestion is used every day in every mental hospital, yet few people realise the immense power of this weapon wisely used. If a person is in the hypnotic state his normal suggestibility is greatly

increased, and he will often accept the most absurd suggestions merely on the word of the person who has hypnotised him. Clearly there is a very promising field for investigation and treatment in the thorough application of suggestion to mental patients. To take but one example, many alcoholic patients have been cured of their craving by undergoing a course of hypnotic treatment, in which it was suggested to them that they had a profound distaste and disgust for alcohol. Unfortunately, the majority of cases in a mental hospital are very difficult, if not impossible, to hypnotise, but most of them are amenable to suggestion in their ordinary waking state.

Persuasion differs from suggestion in the fact that it gives the patient what he considers logical grounds for the acceptance of the idea presented to him. If we succeed in cheering up an invalid by a few minutes' quiet talk about nothing in particular, a pleasant smile and a handshake, we are using suggestion. But if we achieve the same result by pointing out that his injuries might have been worse, that he has time to rest and read, and that he is being well cared for, and will certainly get better, we are using persuasion, because we have provided him with logical reasons for looking on the bright side of things. The beneficial effects of the wise use of these two methods, even in their minor degrees, by a mental nurse who has taken the trouble to study and practise them, cannot be over-estimated. They are constantly employed by physicians in the treatment of disordered and nervous states, and in many cases with marked success.

The third great method of psycho-therapy is that of **psychological analysis.** It is by far the most difficult, and in some ways the most important of the three. It starts with the assumption that the patient's illness is due to thoughts, feelings, and memories which he has driven out of his conscious mind by a process of repression, but which, though he has forgotten their existence, are still producing definite effects upon his conscious life. It consists in its various forms in a complete and detailed exploration of the entire mind of the patient, in the course of which these hidden sources of his illness are brought back to his memory, unravelled, and made clear to him. When this process has been thoroughly carried out and the patient has been taught to realise himself, his history, and his difficulties as they actually are, and not as he imagines them to be, his symptoms disappear.

It is impossible here to give a clear or convincing account of these analytical procedures, which represent perhaps the most wonderful psychological discovery of recent years. It can only be said that while they are of fascinating interest, the carrying of them out is a matter of extreme difficulty, and requires a great deal of time and the help of a very skilful and specially trained physician. None the less, remarkable results are achieved even by minor degrees of these analytical processes, and while, generally speaking, they are not in the province of the nurse, it is well that he should have some idea of what the physician has in view when he treats patients in this way. The greatest drawback to the method in hospital practice is the immense amount of time that is consumed in the prolonged private interviews which it involves.

Closely connected with these special forms of treatment are a number of measures which may be grouped under the heading of **re-education.** Whatever treatment the patient has received, it is clear that before he faces the outside world again, he must be equipped to undertake his duties and responsibilities once more, without risking a fresh breakdown in mental health. Here wise nurses may be of great service. They may point out the road by which apparently irreconcilable ideas can be harmoniously adjusted, and help the patient to transform some unattainable wish into a useful and satisfying activity.

The ordinary routine of a mental hospital plays a great part in this connection, and we may particularly note the great value of ordered work. **Occupation-therapy,** as it is called, is invaluable both as a means of restoring the stability and self-respect of convalescent patients, and as a means of directing the energies of chronic cases into healthy and useful channels. The first thing that strikes any outside observer, when taken through a mental hospital, is the number of patients who are apparently without occupation of any kind. Of course, no one who has not had practical dealings with the insane will ever realise the difficulty of finding suitable employment for the various cases and the impossibility of employing many of them at all. But the fact remains that every possible effort in this direction should be made. The kitchen, the laundry, the various workshops, the grounds and gardens, are all powerful agents in treatment; and so are all forms of indoor occupation and the various amusements and entertainments. It is well to emphasise the fact that they

are all treatment, and that it depends very largely upon the nurse whether they are wisely administered.

Finally, then, we see that the treatment of the insane is a very complex matter, ranging from some of the most difficult procedures known to scientific research down to details which are so simple that the nurse may fail to realise that they are treatment. To a remarkable extent, its value depends not merely upon the means used, but upon the way in which they are applied. It is a matter of scientific fact that the effect of any course of treatment in a mental case is almost directly proportionate to the spirit in which it is given, and it is this tremendous demand on character that makes mental nursing such a difficult and responsible task. Means which are good enough in themselves may positively harm a patient if the heart of a nurse is not in the application of them, and they will never have their maximum result unless applied in that spirit of love which "worketh no ill to his neighbour, and is the fulfilling of the Law."

SECTION XIII

MENTAL DEFICIENCY

THERE are many points of view from which mentally defective persons can be studied, and the special nature of this book requires that its subject-matter shall be regarded, as far as possible, from the standpoint of those who minister to the needs of such persons. Of the readers of these words, the majority will be little concerned with theoretical considerations. They will have before them a number, possibly a large number, of persons who have been, for some reason, sorted out from the general population; and they will want to know, more exactly than the casual knowledge of the ordinary citizen can tell them, the answers to such questions as the following:

(*a*) How does the patient before me differ from a normal person ?

(*b*) Why is he different ?

(*c*) How did he come to be where I find him ?

(*d*) What is to be done with him ?

Searching for the answer to Question (*a*) is what is called "Making a Diagnosis." Question (*b*) has to do with etiology, or the recognition of causes, while Questions (*c*) and (*d*) refer to different aspects of treatment.

DIAGNOSIS.

In our journey through life we constantly meet with persons whose conduct is not in accordance with the standards we have set up in our own minds as indicating a correct way of living. Such departures from the normal we recognise in some cases as being due to the inability of the offender to understand what is required of him, because his mind is abnormal. It has been found convenient to divide cases of this kind into two groups, a distinction being drawn between those in whom the abnormality dates back to the earliest years, and those in whom it has

occurred after development has proceeded sufficiently long to show that the person affected was normal to start with. The latter group is that of the insane, and their peculiarities are dealt with in other sections of this book. We are here concerned with the former group, that of the mentally defective.

Owing to the fact that the above-mentioned distinction has not always been acted upon, there still persists a good deal of confusion in the use of the terms which should be reserved for the mentally defective. It has been suggested, for example, that the designation "amentia" should be applied to the class as a whole, but unfortunately this word has been used as the name of a form of insanity. However, the term is used in one of the leading textbooks on mental deficiency, and primary and secondary forms of the trouble are described.

There has gradually grown up a practice of dividing the mentally defective into three groups, not sharply marked off from each other, but corresponding roughly to very marked cases called *idiots*, very slight cases called *feeble-minded*, and cases in between called *imbeciles;* and as these names are too firmly established to be ignored, the only thing to do with them is to try to make them a little more precise in their application. To begin with, we must lop off superfluous meanings. Since the only pieces of law-making which gave power to deal with mentally abnormal persons were at one time the Lunacy Acts, idiots and imbeciles were brought within their scope, and since those Acts are still effective, idiocy and imbecility are still, legally, forms of insanity. This is partly to be explained by the fact that the term "imbecility" was applied originally to various forms of mindlessness, so that it covered, for example, cases which would now be recognised as *dementia*, and which are dealt with elsewhere. Similarly, the term "feeble-mindedness" has been employed in a loose way, though in the Mental Deficiency Act it is now restricted to a particular class.

In America the name *moron* is applied to members of this class, and there may be some advantage in using the word in this country since it has no misleading associations. One other term should be noted at this stage. It is *moral imbecility*, and it is intended to call attention to the fact that in the persons to whom it is applied the defect is rather moral than intellectual. Except for the indications given above, it is not practicable at this stage to define more precisely who the "mentally defective" are.

What there is in common among the diverse types of mentally defective persons will appear as we proceed, but it may be noted at once that the class is an artificial one, in that it shades off into the classes of the sane and the insane, and in that different teachers draw the boundary-line in different places. To obtain a mental picture of those included under the heading Mentally Defective, we shall proceed to consider the more important of the various schemes of classification which have from time to time been advanced.

Our present-day knowledge has only been arrived at slowly and by small degrees, and we are still under the influence of the traditions of our ancestors. At first only the grosser cases of mental deficiency were recognised, and to the superficial observer these were marked by physical rather than mental peculiarities.

In former days, too, people were accustomed to decide the place in their world of any new thing by instituting comparisons with the things familiar to them. Many of the names used in the section on anatomy are examples of this, though the fact is to a great extent hidden by the use of Latin. It was in this spirit that the first attempts at describing the mentally defective were made. The cases which departed most widely from the normal were regarded as having hardly reached the dignity of humanity; to others it was conceded that they had, at any rate, the intelligence of animals; while a third group was accepted as not greatly falling short of the standard set by the average individual. Later, resemblances to various races of mankind were imagined, and types were distinguished as being like Negroes or Papuans or Aztecs or Mongols. As will appear subsequently, the term "Mongol" still persists in our schemes of classification, though about the only sound argument for using it is that it has become associated with a particular set of cases for which nobody has so far thought of a better name.

The next stage was that in which, by a closer examination of the physical peculiarities, it became possible to sort them into several groups, each group of characters being then adopted as the sign distinguishing a particular type of mentally defective person. Various schemes on these lines have been drawn up, but the only one which need detain us is the one that has been generally used in the past. In order to understand this scheme it is necessary to learn something of the physical peculiarities just mentioned. They are called **stigmata,** which is the plural

form of the Latin and Greek word *stigma*. Originally, this seems to have meant the mark by which a slave was identified, and the word still retains something of the old meaning, and is used in a sense implying inferiority. One must avoid, in dealing with stigmata, the error of assigning to them undue importance. Almost without exception they are not distinctive, either of the mentally defective, insane, criminal, or any other social class in which their presence has been recognised. All that can properly be said about them is: (1) That they occur relatively more frequently in such people than they do among normal persons; and (2) that the lower the grade of defective displaying them, the more marked they tend to be. Where the visible anatomical or physiological character necessarily involves interference with the brain, the stigma is evidence of mental defect. It is impossible, for example, to have a fully developed brain in a very small cranium. Generally, however, stigmata have only a doubtful value as evidence of mental defect, and they must not be regarded too seriously.

All stigmata may be accepted as signs of disease, but looked at from this standpoint they are divisible into two classes. Some of them are what is called "congenital," or primary; they are, that is to say, characters with which the person is born, and the reason why they have appeared may be quite obscure. Others are "acquired," or secondary, by which is meant, in practice, that we know something of the causes of them, such causes being usually diseases to which names have been given. Some writers reserve the term for the congenital or primary marks, but the distinction is difficult to make, and of no particular value when made.

Making allowance, then, for the uncertainty which attends the whole subject, we proceed to consider the stigmata which have been recognised by various observers. Taking first those affecting the body as a whole, we note that children are sometimes born so extremely abnormal as regards their anatomy that they have no capacity for living more than a few hours or days, and are classed as "monsters." As an example of this may be taken the condition called anencephaly, in which the cranial region with its contained brain is practically lacking altogether. Among the defectives who survive we may find that the mere appearance is indicative of a low mental level, the facial expression, the attitude, the movements, the response to attempts at getting into

communication with the individual, all indicate that something is wrong, though it may not be easy to say exactly what causes us to think so. Nobody has much difficulty in deciding that there is something out of the ordinary about a deformed, speechless, dribbling caricature of humanity such as one may see in a ward for idiots. In less marked cases the weight, stature, and general development are below the average. There may be, too, a lopsidedness or asymmetry affecting parts, or the whole, of the body. One side of the head may be of a different shape from the other, the ears may be unequal in size and at different levels, the eye-openings may be placed at different angles, and the mouth may be askew. The spine may show curvature, the upper or the lower limbs may show inequalities in length or shape or in such details as the development of fingers or toes. Studying the skin, we may find it exhibiting irregularities in the arrangement of the hair or peculiarities in the nails; it may be thick or rough, it may display more frequently than in normal individuals marks such as moles, wens, nævi, or " birth marks," or rashes such as characterise the various skin diseases. Of particular interest is the rash sometimes called, from its distribution on the face, the " butterfly rash,"* and known to skin specialists as adenoma sebaceum.

The Head.—Of the parts of the body, the head is most important as the bearer of stigmata, and requires further consideration, the facts to which attention is to be directed being grouped conveniently under the following headings.

(1) **The Cranium.**—Besides asymmetry, this may show abnormalities of size and shape. It may be clearly too small or too large in proportion to the size of the body, and its relative dimensions may not be those of the normal cranium. Measurements may be taken with a tape over the surface of the cranium, or the difference in a straight line between various points may be measured with calipers, or a strip of flexible metal may be moulded to the shape of the head and then removed, retaining its shape, while its contour is marked with a pencil on a sheet of paper to which it has been applied. The height of the cranium can be ascertained by the last method, or by noting the difference between the reading at the level of the ear opening and the full height when the patient is placed against a measuring standard. More accurately the height is measured by means of a metal

* This name is also applied to other rashes of similar distribution.

arc, which has at its ends projections to fit into the ears, and in the middle a graduated screw, which, when the arc is placed in position across the head, can be adjusted to the highest part of the cranium. The distance through which the screw has descended is then deducted from the known height of the arc. By these methods are ascertained the maximum circumference of the cranium and its length, breadth, and height. If the length, breadth, and height of a room are multiplied together, its capacity is obtained. The cranium is not of a shape which can have its size estimated exactly in this simple way, but as craniums (the Latin plural is *crania*) are roughly of similar shape, the results obtained by multiplying length, breadth, and height will be about equally wrong in all cases, and may be used for purposes of comparison, constituting what is known as the "index of size." Another basis of comparison which is used in recording head measurements is the "cephalic index," which is obtained by multiplying the breadth of the cranium by 100 and dividing by the length. Without going into details, it may be said that among members of the same race the "index of size" is lower for the mentally defective than for those of average intelligence, while as regards the "cephalic index" and the circumference the **average** for the mentally defective differs little from the average of normal persons, but the **range of variability** in the size of the heads of the mentally defective exceeds that of normal heads in marked degree. In the past undue importance has been assigned to cranial deformities, and the literature relating to mental defect contains various terms which the reader should be prepared for. When the head is relatively long it is called dolichocephalic, if relatively broad, brachycephalic, while a cranium of medium size is mesocephalic. A scaphocephalic cranium is one which is boat-shaped, and an oxycephalic cranium is high and somewhat pointed. It is interesting to note that among savage tribes deformities of the skull are sometimes produced intentionally by bandaging tightly the heads of infants, a practice suggesting mental defect on the part of the parents at any rate. Occasionally it happens that the scalp seems too large for the cranium, and is thrown into folds or corrugations.

(2) **The Ears.**—These may be too large or too small, too round or too long, with the lobules larger or smaller, and more adherent or less adherent than is normal. Irregularities in the shape and relative sizes of the various folds and hollows are also met with.

(3) **The Eyes**—(*a*) *Eyelids.*—The space between the lids, called the palpebral fissure, may be shortened or set obliquely, and there may be a fold of skin extending from the upper lid across the inner end of the space. This last condition is called epicanthus. The edges of the eyelids often exhibit signs of old inflammation which has led to thickening and loss of lashes.

(*b*) *Eye Muscles.*—Various forms of spasm and paralysis in these give rise to squint, and the twitching movements of the ball termed nystagmus.

(*c*) *Eyeballs.*—Inspection may reveal opacity of the cornea (nebula) or of the lens (cataract). The iris may be speckled, or have the pupil not in the centre, or deficient at the bottom owing to imperfect development (coloboma).

(4) **The Nose.**—A well-shaped nose is unusual among the mentally defective, but the departures from the normal which this organ may show have no special significance. A sunken bridge may suggest syphilis.

(5) **The Mouth.**—Misshapen jaws in which the teeth are crowded so that they interfere with each other's growth are found. In low-grade cases there may be deformity sufficient to prevent the mouth from being closed properly. A high and narrow palate is common enough, but it is doubtful whether this abnormality is commoner among the mentally defective than among the normal minded. If any particular type of palate is characteristic of mental defect it is a very wide and shallow one, sometimes found among patients of the lowest grade. The tongue in certain instances is unduly large, and it may be deeply marked with fissures. Fissures in the skin about the angles of the mouth may occur in syphilitic cases.

The Trunk.—This may be ungainly from undue and irregular deposit of fat or the peculiar material known as myxoid substance. The front of the chest may show extra nipples of a rudimentary character, while at the back of the chest there may be noticeable a scapula of what is called the scaphoid type, in which the edge of the bone nearest the spine is concave instead of convex. The abdominal wall may bulge forward, and hernia may be found. Malformations of the generative organs are also not uncommon.

The Limbs.—Deformities of many kinds may be present. The muscles may be wasted or apparently over-developed; the bones wasted, thickened, or bent. Joint ligaments may be

unduly slack, so that there is an unusual range of movement combined with unsteadiness. The hands may be stumpy, with thick and curved fingers, and the finger-prints may show little distinctiveness. Both fingers and toes may not have the customary relationship, and more or less complete fusion or webbing together may be found. Both show, too, a special susceptibility to chilblains.

We have next to consider the stigmata which may be classed as physiological. Of these, as with the anatomical stigmata, it is to be noted that they are not confined to the mentally defective, though they occur more frequently among them.

Disordered function is most prominently displayed by the muscles. Even though the muscles themselves may be healthy, they are under the control of a nervous mechanism which can only through them make manifest its abnormal working. Irregularities of the reflexes are more common than among the general public; thus in a series of 150 imbeciles examined only fifty, or one-third, had normal knee-jerks. Spasms of muscles occur in varied forms; thus we find instances of the condition called tetany, in which the hands and feet assume peculiar positions, and of chorea or St. Vitus's dance, in which there is a general "fidgetiness," with jerky uncontrolled movements of the limbs or of the whole body. Another group of irregular movements constitutes the **tics.** These may take the form of twitching of facial muscles; an impulse to touch everything; rocking, swaying, or twisting the body; nodding or turning the head; banging the head against the wall or with the fist: and "tricks" of a similar kind.

More general affection of the muscles may assume the form of (1) **Catalepsy.**—In this there is general rigidity, causing the patient's limbs to remain for a long period in any position in which the examiner has placed them; or (2) **Convulsions.**—These are particularly characteristic of hysteria and epilepsy, although they are not of necessity due to either of these conditions, nor are they necessarily forerunners of them.

Nervous instability may show itself in other ways. Thus there may occur what are called "night terrors," the child waking up in a fright gasping for breath, or "bad habits" may be developed, such as constant gnawing at the finger-nails, sucking the thumb, picking at the skin, or eating filth. Screaming fits and gusts of passion may also occur.

Another peculiarity of a different order is ambidexterity, or the practice of using either hand indifferently. Among functional defects the most important are those of speech. Communication of ideas may be effected in various ways, and in so far as the expression of our ideas is understood by anyone observing us, we may be regarded as having employed language. The "nods, and becks, and wreathèd smiles" of which the poet tells; the signs, the grimaces, the gestures we employ; the attitudes we strike; our drawing, modelling, and the like, are all forms of language. But the most useful and the most advanced form is speech, with which writing is closely connected. So important is the use of words, both as an indication of the mental capacity and as a means of developing the mind, that it has been employed as the basis for distinguishing groups of the mentally defective; thus inability to communicate by means of speech has been regarded as the mark of the idiot, while inability to communicate by writing has been accepted as evidence of imbecility.

Since there is this intimate relation between intelligence and the power of speech, it is only to be expected that speech defects will be especially prevalent among the mentally defective. For the due manifestation of speech necessitates the harmonious working of (1) the sensory apparatus for receiving and conveying impressions to the brain from the ear, and, to a less important extent, from the eye; (2) the motor apparatus—*i.e.*, the muscles concerned in the production of the voice and the nerves setting them in operation; and (3) the group of "centres" in the brain which are the seats of intellectual processes. Something wrong in any of these departments will show itself in a more or less well-marked incapacity to employ normal speech.

(1) **The Sensory Side.**—A child born deaf will also be dumb, since he will be unable to learn the sounds of words and therefore be unable to reproduce them. If he becomes deaf in early life, say before the age of seven years, the result is usually much the same; for the vocabulary acquired is too small to be of practical use, and is gradually forgotten. It is a matter of experience that the deaf can learn to speak by imitating the lip movements of those about them, and this is one of the ways in which vision is of importance in connection with speech. Another way in which vision is of service is that it enables us through reading to add to the mind's stock of words.

(2) **The Motor Side.**—Apart from the cases in which there is some anatomical defect such as cleft palate, or some interference with the functions of muscles or nerves due to inflammation or other causes, it is not practicable to mark off clearly from the cases in the third group those which are more conveniently considered under this heading; cases, that is to say, in which the obvious defect is in the muscles of articulation. Included here are:

(*a*) *Aphonia.*—In this condition the patient seems incapable of speaking in anything louder than a whisper, and his voice may be almost inaudible in spite of his efforts to strengthen it.

(*b*) *Stammering and Stuttering.*—The distinction between these defects is difficult, because both terms are used as having much the same meaning. The former term is best applied to the spasms which prevent or interrupt speech, and the latter to the repetition of the sounds of individual letters, usually consonants, which generally accompanies it.

(*c*) *General defects,* such as very slow or very rapid utterance; the omission of syllables, slurring, stumbling over, or undue separation of them.

(3) **Central Processes.**—Although the muscular mechanism for the production of speech may be working properly, the mind may be in such a condition that it either has nothing at all to express or nothing appropriate to the circumstances. If the mind has not developed beyond the baby stage, the attempts at speech may amount to no more than noise-making. At somewhat higher levels of intelligence we may get:

(*a*) *Lalling.*—A persistence of infantile babbling.

(*b*) *Idioglossia.*—A further step in the direction of ordinary speech in which the child tries to evade difficulties by inventing a speech of its own, omitting, or providing substitutes for, normal sounds.

(*c*) *Agrammatism.*—A form of speech representing a considerable advance on those already mentioned, but defective in that it ignores the grammatical structure of the language as ordinarily spoken, the words used being jumbled together.

(*d*) *Lisping.*—This is by no means confined to mentally defective persons. It consists in the very indistinct enunciation of certain consonants or in the substitution for them of others, thus *t* may be used for *k*, *th* for *s*, *f* for *th*, or *w* for *r*.

A characteristic often met with, though perhaps it can hardly

be termed a defect, is a tendency to answer questions in the briefest possible way. Thus, if asked such questions as "Do you know how old you are?" or "Can you tell me the King's name?" the patient will reply simply "Yes," instead of supplying detailed information as a normal child would be likely to do.

We may meet also with conditions in which a child repeats what is said to it, perhaps with slight modification, and often as a preliminary to answering, thus:

"Where do you live?"

"Where do I live? I live at——"

"Can you read and write?"

"Can I read and write? Yes, I can read and write."

This sort of thing is called **echolalia.**

Sometimes there is a tendency to pour out a stream of obscene expressions, a peculiarity to which the designation **coprolalia** is attached.

Low-grade cases occasionally present a sign more usually met with in some cases of dementia. They indulge in what is called **verbigeration,** the endless repetition of a word or phrase which appears to have no meaning.

Another group of speech defects of central origin is that to which the name **aphasia** is applied. Here it is assumed that the brain centres which control the actions of speaking and writing are out of order, so that the person concerned cannot carry out those activities of the throat or hand muscles which are called for. Some writers call this condition "motor" aphasia, and apply the term "sensory" aphasia to a state of things in which the defect is in the "centres" used in the recognition of spoken or written words. Sensory aphasia, which takes the forms of "word-deafness" or "word-blindness"—*i.e.*, inability to understand certain words when they are heard or seen—is also sometimes distinguished from motor or true aphasia by applying to it the name "agnosia." Recently it has been taught that the old notion of aphasia as dependent on imperfections in special brain centres is not well founded, and that the condition is a disorder of a special aspect of intelligence, the capacity for putting what it is desired to say in the form of a definite proposition. The importance of realising that such a condition as aphasia exists lies in the fact that a quite erroneous conception of the extent of a person's mental defect may be formed, if his inability

to speak is put down to that abnormality of the higher intellectual functions which occurs in idiocy.

Although it is not a disorder of speech in the narrow sense, we may appropriately note here the occurrence of what is called "mirror writing." In an early stage of development there is a tendency to use either hand indiscriminately, and if a child or a mentally backward person tries to make the movements of writing with the left hand instead of the right, the effect is that the writing produced is reversed, so that it bears to ordinary writing the same relation as an image in a mirror does to what is placed in front of the mirror.

So far the evidence of abnormality has been sought for in connection with the anatomical and physiological aspects of human beings. Not less important is the ill-defined psychological aspect which shades off into the still more obscure metaphysical one. The study of abnormal psychology is naturally based on that of normal psychology, a subject elsewhere dealt with. Perhaps the most conspicuous lack of the defective mind is in regard to the capacity for attending to its impressions, but what is chiefly in evidence is the want of control of the inherited instincts. Since the whole social scheme is based on such control, the mentally defective are excluded from the higher developments of civilisation. It is interesting to note, as will appear more clearly later, when we are dealing with moral imbecility, that while the practice of virtue demands intelligence, it does not follow that the intelligent are always virtuous. The instincts are difficult to enumerate, since they are known by their fruits, and these are not always the same; but the chief ones are those concerned with self-preservation and with the perpetuation of the species.

The curiosity which discovers food and serves as a guard against surprise; the fear of, disgust at, and flight from obnoxious influences; the attempt to overcome perils by associating in herds and by fighting; the imitativeness which makes combined action possible; the pride in a successful encounter; all these are illustrations of the instincts in the first class. The attraction towards members of the opposite sex; the affection for children; the care of the home; will serve as examples of the second class. In regard to all these and the temperament compounded of them, the mentally defective person may depart so widely from accepted standards that it is impossible for him to take his place in the community on an equal footing with his fellows.

Classes of Defective Persons.

The older classification already mentioned on p. 520 recognises thirteen varieties of mentally defective persons: (1) Genetous (2) Mongolian; (3) microcephalic; (4) hydrocephalic; (5) hypertrophic; (6) eclampsic; (7) epileptic; (8) paralytic; (9) traumatic; (10) inflammatory or post-febrile; (11) syphilitic; (12) cretinoid; (13) cases due to deprivation of senses.

Such characteristics as serve to define these varieties are for the most part structural stigmata of the kind already described, though in some cases evidences of abnormalities of function are considered with the anatomical defects. The classification is in the main that of Dr. Ireland.

(1) **Genetous Type.**—This term is used somewhat loosely. Dr. Ireland applied it to cases in which some unknown process of disease acting before birth handicaps the individual, from the outset, with disabilities which render him permanently unable to compete in the race of life with normal persons. More generally the term is applied to cases with inherited constitutional defects, but showing no special defects of structure or function to distinguish them from the rank and file.

(2) **Mongolian Type.**—This was included under the " genetous " type by Dr. Ireland, but since it is, when well developed, one of the most distinctive types of all, it may well be accorded the dignity of a separate place. It owes its name to a fancied resemblance between these cases and individuals belonging to the Mongol race.*

(3) **Microcephalic Type.**—These are the cases with abnormally small heads, usually of the " oxycephalic " form.

(4) **Hydrocephalic Type.**—When, as the result of an over-secretion of cerebro-spinal fluid, the pressure within the skull becomes so great as to distend the cranial wall, a large rounded head results, indicating what is popularly called " water on the brain."

(5) **Hypertrophic Type.**—In these cases the brain is larger than normal, though the increased size is due to an increase in the neuroglia, or special connective tissue which binds the neurons together, rather than to an increase in the number or size of these.

* The words " Kalmuck," " Tatar," and " Tartar," are used in the description of this type as equivalent to Mongol. The fact may be noted, but to discuss the propriety of this usage would take us too far afield.

(6) **Eclampsic or Eclamptic Type.**—Parents often attribute the mental defect of their children to the occurrence of convulsions in early life, and it may be that these convulsions do cause permanent injury. The group of cases which falls under the heading "eclampsic" may be taken to be one in which "fits" have occurred without this process being continued into the development of definite epilepsy.

(7) **Epileptic Type.**—Epilepsy is quite commonly associated with mental deficiency. Of the thirteen groups now under consideration, the eclampsic is excluded by the terms of its definition, and epilepsy is extremely infrequent among those classed as Mongols. Members of any of the other groups may show it, and the assumption that epilepsy "causes" mental defect is probably erroneous. The fits are rather to be regarded as one of the signs that we are dealing with a defective brain. Epilepsy is like the "stigmata," in that the lower the intellectual level, the commoner it is; but there is no simple relation between the disease and the form or degree of the mental defect. For the nurse the importance of epilepsy lies in its bearing upon the care and control of patients, a matter dealt with elsewhere.

(8) **Paralytic Type.**—Like epilepsy, paralysis in its various forms occurs widely among the mentally defective, and since it varies in degree very largely with the extent of the damage which the brain has suffered, it is likely to be more marked the lower the grade of case under consideration.

(9) **Traumatic Type.**—This name is derived from the word *trauma*, meaning a wound or injury, and its use is intended to imply that the mental defect observed has been caused by an accident affecting the brain. The accident may have occurred at or after birth. There is nothing distinctive about the mental defect found in cases of this sort.

(10) **Inflammatory or Post-Febrile Type.**—These cases are allied to those of the traumatic type in that they depend on damage done to the brain, but the injurious agent is here a poison set free in the course of a disease. There may be an inflammation affecting the brain directly, but it seems probable that the trouble usually arises in the meninges or membranes covering the brain. Cases have been reported as following on attacks of smallpox, measles, or scarlet fever, or as due to the spread of disease from the ear; others are caused by special organisms. Cases occurring as the result of the disease popularly

known as "sleepy sickness" may be included here. Often it appears that the trouble precedes birth.

(11) **Syphilitic Type.**—Much importance has been attached by various writers to syphilis as a cause of mental defect. If a child who is mentally defective also presents evidence of having suffered from syphilis, it is usually assumed that the former condition is caused by the latter. The extent to which this is true is a matter of considerable doubt, and though the physical signs which may be classed as "stigmata" may be definite enough, there is nothing distinctive about the mental signs except in the case where the condition known as juvenile general paralysis occurs. One or more of the following stigmata may be found, the particular ones observed depending in some degree on the stage which the disease has reached. There may be a general poorness of physique, with disease of the nose ranging from snuffling to destruction of the nasal bones, so marked as to cause a flattening out of the bridge of the nose. Especially suggestive are three characteristics known as "Hutchinson's triad," from the name of the writer who first described them. These are: Deafness originating in the deeper parts of the ear; changes producing opaque areas in the cornea; and a peculiar shape of the two middle upper permanent incisors, which are peg-like and notched. Other features which may be present are scarring round the mouth, tenderness and enlargement of the ends of the long bones, and rashes of various kinds. Of late years reliance has been especially placed on an examination of the blood in suspected cases; what is called the "Wassermann reaction" being obtained when syphilis is present. In the great majority of the cases here under consideration the disease is congenital, having been transmitted to the child by one or both of its parents.

(12) **Cretinoid Type.**—The examples of this type are often confused with those belonging to the Mongol group, to which they bear some resemblance. It is now recognised that the cretinoid state is due to disease of the thyroid gland, and with this knowledge to guide them, medical men have been able to do so much in the direction of cure that well-marked cases are becoming rare in this country.

(13) **Cases Originating in "Deprivation of the Senses."**—In the section of this book which treats of psychology, attention is drawn to the important part played by the sense organs in providing the material of thought, and it is easy to understand that

if the channels of communication with the outside world are blocked, there will be much interference with the acquisition of mental capital.

Dr. Ireland applied the description "idiocy by deprivation" to "that condition of mind in which a child remains who is deprived of two or more of the principal senses, such as sight and hearing," as also to that produced, "not by loss of the senses, but by deprivation of the power of exercising them." As examples of the former type we have Laura Bridgman and Helen Keller (see p. 574), both of whom became blind and deaf in early life, while the case of Kaspar Hauser, found wandering and unable to give an account of himself at Nuremberg in 1828, illustrates the effects of lack of opportunity to learn. In all these cases considerable progress in intellectual development occurred as the result of special tuition, so that it seems questionable whether they should be classed as mentally defective at all; but in some instances—*e.g.*, that of the Wild Boy of Aveyron in France, found at the end of the eighteenth century—the provision of opportunities for learning gave rise to no substantial improvement.

It will probably occur to the reader that the classification outlined above is not very satisfactory, if only for the reason that a particular instance of mental defect may be assigned to more than one class. Epilepsy may be associated with many of the other forms of defect, and the same may be said of paralysis. The relation between epilepsy and paralysis is close. Among 75 epileptic patients 29 were paralysed, while among a similar group of 75 non-epileptic patients, only 12 were paralysed. The group of the inflammatory or postfebrile cases may include microcephalic and hydrocephalic forms, together with some of those referred to in Class 13; thus Laura Bridgman's defect followed scarlet fever. Similarly, chronic syphilitic inflammation of the vessels of the brain or special sense organs may produce effects which may appear to belong to another group, in the absence of a complete history of the patient.

If, in classifying the mentally defective, attention is to be paid to anatomical characters, the following scheme will be found more comprehensive and distinctive. Some of its classes correspond to those in the scheme already described, and where this is the case the detailed description of the type has been held over to avoid repetition. At the outset we must remember that

in the majority of cases the mentally defective do not present anatomical peculiarities that will serve to mark them off from normal persons. The first stage in the classification, then, is a division into two groups:

(*a*) Not distinguishable by well-marked peculiarities of the bodily structure or its functions.

(*b*) Marked by the presence of " stigmata."

Of class (*a*) there is from our present standpoint no more to be said. In class (*b*) may be distinguished individuals who may be described as conforming to one of the following types: (1) Infantile; (2) Mongolian; (3) microcephalic; (4) macrocephalic; (5) cretinoid; (6) epiloiac; (7) plegic; (8) progressive.

(1) **Infantile Type.**—Since it is especially characteristic of the mentally defective that, mentally, they have not grown up, the same feature may be looked for in their bodily conformation. There are cases of this sort in which the lack of development is general, and therefore expresses itself in the retention of childish characters long after they should have disappeared. During the growth of the normal body, for example, the relative sizes of different parts undergo alteration. Dividing the total height into eighths, at birth it is made up as to $\frac{2}{8}$ by the head, while the trunk represents $\frac{3}{8}$, and the lower limbs $\frac{3}{8}$ also. In the adult only $\frac{1}{8}$ of the height is represented by the head, the trunk still occupies $\frac{3}{8}$, and the lower limbs account for $\frac{4}{8}$. The change from one stage to the other may proceed too slowly, or appear to stop altogether, so that the person concerned looks much younger than his age. The changes in the hardening of the bones or in the voice, which would accompany maturity, may also be absent. A pure infantilism of this kind is rare, and it is usual to include under the same heading cases in which the backwardness in development is of a more irregular nature, though not sufficiently definite in its results to bring the case within the scope of one of the other groups in the scheme. Any system of organs—nervous, vascular, alimentary—may be at fault, and it is probable that diseases affecting the endocrine glands are often concerned in the matter.

(2) **Mongolian Type.**—Although this is fairly distinctive when well marked, there are cases which may be overlooked, since most of the special peculiarities may be absent. It is, in fact, difficult to analyse the picture presented by the Mongol, even when recognised, for with the exception of a fissured tongue

there is no particular character which is present in even a majority of the cases. The commonest elements of the picture are a small and rounded cranium, often as broad as it is long, a flat face with reddish complexion, and sore eyes, for these cases frequently suffer from inflammation of the edges of the eyelids. The eyes may be obliquely set and rather wide apart, with occasionally such defects as epicanthus, squint, nystagmus, cataract, and a speckled condition of the iris. The hands and feet are broad, the fingers and toes being short, and sometimes webbed together to a greater or less extent. Owing to defects in the circulatory system chilblains are usual in the winter months. Abdominal enlargement and hernia may occur. The joint ligaments generally are lax, so that the joints can be extended beyond the normal. Sundry other abnormalities have been described, but they are not found often enough to have much value in helping one to recognise the type. Being of poor physique, these cases show special susceptibility to infectious diseases, as, for example, tuberculosis; and their lack of resistive power is no doubt the reason why in some cases the body temperature has a way of jumping up and down with a minimum of provocation. Heredity does not seem to play so prominent a part in the causation of this type of defect as with some others, and the particular case under observation is likely to be the only one in the family. The patient is often the last child of a family, which has been taken to indicate a lack of vitality on the part of the parents, but this is not the only conceivable explanation. On the whole, the most probable cause seems to be some disorder of the endocrine glands, though at present it is impossible to say how the results are brought about. Perhaps because they do not, when the condition is well marked, survive beyond the years of childhood, epilepsy is very rare among them. Mentally they are often lively and good-tempered, with an appreciation of rhythm and a weakness for imitation. This appearance of brightness is, however, misleading. What they are taught is speedily forgotten, and their progress is often very disappointing to their relatives, who form quite exaggerated ideas as to their capacity.

(3) **Microcephalic Type.**—For the determination of this type we are dependent on *one* feature, not on the presence of a larger or smaller selection from a group of characters. The only doubt which can arise about the limits of the class of microcephalic

defectives is about the cranial dimension that must be accepted as indicating small-headedness. Clearly, the size of the body as a whole must be taken into consideration, for a head which would be small for a normal man might bear, in a dwarf, the right proportion to the rest of the body. The average size of the normal head differs with age and sex, but the following figures have been given as approximately correct.

Circumference of head at	1 year	.. ..	18 inches.
,, ,,	2 years	.. ..	20 ,,
,, ,,	4 ,,	.. ..	21 ,,
,, ,,	10 ,,	.. ..	21½ ,,

while for the adult the circumference is about 22 inches. Assuming that the general development of the body has followed normal lines, a head 3 inches under the average for a particular age will probable be associated with well-marked mental defect, and one 2 inches below the average with a defect easily recognisable. Unlike Mongolism, the condition may be found in more than one member of a family, which suggests that it is due to some natural tendency of development rather than to some cause—*e.g.*, injury or disease acting from without.* This family tendency, taken together with a fancied resemblance of some cases to monkeys, suggested to certain observers that the condition was due to a reversion or throwing back to some earlier stage in evolution. It has also been supposed that the small brain, which is naturally all that the small cranium will hold, is due to a premature joining together of the bones of the skull, which has prevented the brain from growing to its normal size. The fact that the scalp is occasionally found in microcephalics to be loose and corrugated, as though too big for the brain-case, might seem to offer some support to this view, but the balance of the evidence is against it. If the bone of the skull be cut through in order to relieve the supposed pressure, the brain does not grow. On the other hand, as our experience of hydrocephalus shows, when there is increased pressure within the cranial cavity the bones of the skull do yield to it. The small size of the brain is, then, most probably due to abnormal development, and this is not always of the same kind, for microcephalic brains are not by any means all alike, except for their being much below the average in size and weight. Perhaps this is the

* Thus, there is recorded a case in which eight children out of a family of nine were microcephalic.

explanation of the observed fact that mentally there is nothing distinctive about the microcephalic type, for all kinds and degrees of intellectual defect may occur. All sorts of physical defects may also be found, but, as already indicated, there is nothing characteristic about these either.

(4) **Macrocephalic Type.**—Just as there are persons who attract attention because of the small size of their heads, so there are cases in which the opposite condition is the outstanding feature. A large head is not, taken by itself, evidence of mental defect, though experience has shown that some types of large heads are associated with abnormal brains. Where the increased dimensions are due to overgrowth of the bone of the skull, as in rickets, there may be no more than a slight degree of weak-mindedness, which may be attributed to the general want of proper nutrition of which the rickety deformity is a sign. In two other groups of cases there is, however, an intimate relation between the size of the cranium and the condition of the brain. We may therefore subdivide the large-headed into three classes:

(*a*) Those in whom the brain is apparently normal, except that it is not of good quality. Here are included the " box-shaped " heads which occur in rickets, and the deformed skulls which may owe their origin to syphilis, and such rare diseases as acromegaly, osteitis deformans, etc.

(*b*) Those with a too large brain. These are the cases brought under the heading " hypertrophic " in the scheme of classification described earlier. They may perhaps be better described as " megalencephalic," which indicates that the brain is big without committing one to any opinion about its quality. There is nothing very distinctive about the large head in this class; indeed, the fact that the brain is considerably over the normal weight may be the first thing to call attention to the abnormal size of the head. It is said, however, that during life these cases display some characteristic signs as, for example, chronic headache, epileptic fits, and general weakness of the muscles.

(*c*) Those whose heads are enlarged as the result of the pressure from the accumulation of an excess of cerebro-spinal fluid within the cranial cavity. While some part of the surplus fluid is found between the brain and the dura mater, the bulk of it is contained within the lateral ventricles. The walls of the cerebral hemispheres are thinned, so that on draining away the fluid they collapse like those of a burst football, and the con-

volutions and sulci of the cortex are flattened out against the inside of the skull. Owing to the uniform pressure in all directions, the cranium tends towards a globular shape, unlike that due to rickets or megalencephaly. In this class, too, the head may become very large indeed, even a circumference exceeding a yard having been recorded. The enlargement of the head may take place rapidly, thus, in a reported case, the circumference increased from 18 to 28 inches in less than four months. Interference with the brain on such a scale as these examples indicate naturally results in great disturbance of the cerebral functions, but if the over-production of cerebro-spinal fluid ceases, a certain amount of recovery seems to be possible, and, considering the extent of their physical disabilities, hydrocephalics often show a fair measure of intelligence.

(5) **Cretinoid Type.**—Many years ago a distinguished physician thought it worth while to call the attention of his fellow-practitioners to the fact that, as he put it, while every cretin is an idiot, every idiot is not a cretin. The history of those days, when the care of mentally defective cases was just beginning, shows that such provision as was made in the way of homes and institutions was intended for cretins, they being the obvious and ordinary cases of idiocy which were met with.

In some parts of the world, as, for example, the mountain valleys of the Alps and the Himalayas, cretinism is still common, and from time to time a case is admitted into some British hospital, but the nurse who looks after the mentally defective now gets little opportunity of seeing one, and the cases which are seen do not usually present the strongly marked characteristics described in textbooks, there being only the residual signs which treatment has failed to remove.. In these days great importance is attached to what are called, variously, the endocrine organs, ductless glands, or organs of internal secretion, and the main interest of the cretinoid type is now its resemblance to cases in which the thyroid gland (the endocrine organ which has been most exhaustively studied) has ceased, partly or wholly, to perform its functions, whether as the result of injury or disease. Some or all of the following abnormalities may be found where growth has been interfered with by a deficiency of thyroid secretion in early life. The body is stunted, and the abdomen protuberant and prone to the development of hernia; the skin, rough and thick, with few and coarse hairs, is cold and clammy

to the touch; the hands and feet are broad and clumsy; and the bones may be thickened, shortened, or deformed in other ways. Laxity of ligaments permits over-extension of joints. There is an over-production of fat and an irregular distribution of it, leading, for example, to the formation of pads at the base of the neck above the clavicles. The eyelids are thickened and baggy, the mouth open and dribbling, with a large, but not fissured, tongue, and irregular and decayed teeth. Though not performing its normal functions, the thyroid gland may be enlarged, giving rise to a goitre. Hearing and cutaneous sensibility are diminished, and reaction to stimuli is slow. The patients are usually stolid, unobservant, and apathetic, only desiring to be let alone; and though they may be stirred to anger, it is said that they never shed tears. They are very susceptible to cold, and in many instances die quite suddenly, apparently as the result of weak action of the heart. In some cases the effects of the disease seem to be most marked on the nervous system, cases resembling those referred to later as examples of diplegia occurring. Here what are called the parathyroid glands may be chiefly at fault, and it may be, too, that the failure of treatment with thyroid gland to produce complete recovery, which is sometimes observed, may be dependent on the still obscure functions of these small subsidiary bodies. Although when cretins and cases of the Mongol type are seen side by side it is usually easy to distinguish between them, the points of difference are elusive and general; but one may contrast the small rounded head, flat face, florid complexion, fissured tongue, and chronic inflammation of the eyelids of the latter with the longer head, sallow skin, and large smooth tongue of the cretin. There are also the differences of temperament which have been mentioned.

(6) **Epiloiac Type.**—This name has been proposed for a small group of cases which have sufficiently well-marked characters to make it convenient to bring them under one head. They present the following features: (i.) epilepsy, often of a severe type; (ii.) the peculiar condition of the skin known as adenoma sebaceum; (iii.) brain changes, taking the form of a special kind of hardening or sclerosis of the cerebral cortex and the appearance of small whitish growths in the lateral ventricles; and (iv.) tumours of the kidneys. Occasionally new growths are found in the heart, the liver, the spleen, and elsewhere. As with other types, every feature may not be present in every case, but the associa-

tion of the characters mentioned has been observed in a sufficiently large number of cases to make it improbable that it is merely accidental.

(7) **Paralytic or Plegic Type.**—Some degree of crippling of the limbs is fairly common among the mentally defective. It is associated with weakness of the limb muscles and, if of old standing, with wasting of the limb affecting both muscles and bones, so that the limb concerned may be shorter and more slender than the corresponding sound one. If the paralysis is confined to some only of the muscles, the relative overaction of the sound muscles causes deformity. The trouble may not be confined to one side of the body. All sorts of paralytic states are met with; thus we may have:

Monoplegia, or paralysis of a single limb.

Diplegia, or paralysis of corresponding parts of the body.

Hemiplegia, or paralysis affecting one side of the body.

Crossed hemiplegia, affecting the face on one side and the limbs on the opposite side.

Paraplegia, affecting both legs and possibly the lower parts of the trunk.

Ophthalmoplegia, or paralysis of the eye muscles, and so on.

Very generally it will be found on examination that there is interference not only with the movement of a part, but also with its power of appreciating stimuli. Such a state of insensibility is called anæsthesia. Moreover, the part may be moved involuntarily, although the will has no power over it; thus a paralysed arm may show what is called athetosis—a slow, rhythmical movement of the hand and fingers. The helplessness of a part may be due to many causes; thus the primary seat of the trouble may be in the bones or joints themselves, as in some cases of tubercular infection, or in the muscles, or in the spinal cord, or in the brain, and the source of the mischief may be an error in development, an injury, or a process of inflammation. Naturally, it is particularly the cases in whom the brain is affected who are likely to show mental, in addition to physical, defect. Of these the most important are the diplegias and the hemiplegias. If for any reason symmetrical parts of the two hemispheres of the brain are damaged, the resulting paralysis will also be symmetrical. In practice it appears that the diplegias, when of cerebral origin, are due to degeneration taking place in the cortex of the hemispheres before the child is born. The hemi-

plegias, on the other hand, are more usually caused by an injury to the brain at or after birth, or by some inflammatory process occurring in early life.

(8) **Progressive Types.**—The distinctive feature of these cases is that once signs of defect have appeared the patient gets steadily worse, until, in a comparatively short time, a fatal termination is reached. Two main groups of cases are recognisable.

(*a*) *General Paralysis.*—A form of insanity bearing this name is fairly common among adults, and is dealt with in the appropriate section. As met with in children, the disorder shows many points of resemblance to the adult type, at any rate, as far as the bodily signs of disease are concerned. Thus, there may be disorders of speech and of the reflexes, as, for instance, the pupil reactions and the knee-jerks. Tremors, incoordination of movements, and fits much like those of epilepsy occur, and eventually there is wasting of the tissues, crippling paralysis, and an increasing bodily weakness with loss of control over the bowels and bladder. At first sight this form of disease may not seem to conform to the general idea of mental defect as appearing as early in life as it can be observed, for the children who succumb to general paralysis may for several years appear to be normal. In most cases, if not in all, they are, however, the victims of a syphilitic infection transmitted to them by their parents, which has set up a progressive inflammation of the brain and its membranes.

(*b*) *Amaurotic Family Idiocy.*—Though it is difficult to say just how much ground this name was originally meant to cover, it may be taken as applicable to certain cases in which there is a progressive mental defect associated with failure of sight and muscular power. Hardening of the grey matter of the brain and spinal cord is found if a post-mortem examination is made. Several instances may occur in one family, so that it would appear to be due to an inherited defect. One type of it seems confined to the Hebrew race. It begins at about the age of three months, and death usually occurs after an illness lasting for a couple of years. A form which occurs in older children, and is not restricted to Jews, has also been described.

Reference has already been made to the fact that large numbers of the mentally defective do not exhibit stigmata such as the foregoing schemes are based on. As more attention is devoted to the subject, it becomes obvious that much of the past study of

mental defect has been of a superficial character, and that important aspects of the matter have been ignored. It may well be doubted whether the schemes so far mentioned have to do with the most essential things.

The main purpose of classification is to help us in our attempts to deal with the mentally defective in the way which shall be best for everybody concerned. In so far as what has gone before enables us to identify the conditions which cause mental defect, it helps us to get rid of those conditions. Thus, to know that a particular patient shows signs of having suffered from an infectious disease may raise a presumption that the disease has had something to do with his mental defect, and to that extent aid in the abolition of cases of that special type. In practice, however, the schemes of classification founded on anatomical or physiological peculiarities do not give much help in this way.

In the drafting of the Mental Deficiency Act different ground was taken. The Act does not attempt to indicate the boundaries of mental defect, but it defines four groups of persons whose characteristics bring them within those boundaries.

As given in Section I. of the Act, the definitions are worded as follows:

(*a*) Idiots—that is to say, persons so deeply defective in mind from birth or from an early age as to be unable to guard themselves against common physical dangers;

(*b*) Imbeciles—that is to say, persons in whose case there exists from birth or from an early age mental defectiveness not amounting to idiocy, yet so pronounced that they are incapable of managing themselves or their affairs, or, in the case of children, of being taught to do so;

(*c*) Feeble-minded persons—that is to say, persons in whose case there exists from birth or from an early age mental defectiveness not amounting to imbecility, yet so pronounced that they require care, supervision, and control for their own protection or for the protection of others or, in the case of children, that they, by reason of such defectiveness, appear to be permanently incapable of receiving proper benefit from the instruction in ordinary schools;

(*d*) Moral imbeciles—that is to say, persons who from an early age display some permanent mental defect coupled with strong vicious or criminal propensities on which punishment has had little or no deterrent effect.

Each of these definitions includes a reference to the early onset of the defect which, as we have seen, is the circumstance which marks off the mentally defective as a whole from the group of the insane. The distinction between the subgroups is made on social grounds. It is determined by such considerations as whether the person in question is a source of danger to himself or those about him, and the extent to which this danger calls for interference with his personal liberty. Although these definitions may be satisfactory so far as they go, experience of them soon shows that they do not go far enough. They contain the seeds of numerous doubts and difficulties with which the nurse is not especially concerned and which, consequently, need not be dwelt upon here, but apart from this they do not tell the nurse all that he is expected to know about the various classes. The Commissioners of the Board of Control, who are the persons primarily responsible for the working of the Act, are not content with a mere statement in the words of the Act as, for example, that a case requires "care, supervision, and control." They want to know *why* he requires these things, and the medical officer of an institution expects the nursing staff to supply information which will help him to answer the question. Some sort of practical standard, therefore, must be set up. If, after the age of infancy has been passed, the patient is unable to control his bowels or bladder or the disposal of his saliva; to speak; to recognise or deal with his food; to wash or dress himself even imperfectly; or to show interest in what is going on about him, he may be classed as an idiot. If, though able to attend to his primitive needs, he does not know his own bed, is ignorant of such matters as his full name, or the day of the week, or what he has just had for dinner; is unable to spell the simplest words, or even to repeat the letters of the alphabet; to count, to tell the time, to distinguish his right hand from his left and so forth, he may be regarded as an imbecile.

The feeble-minded person, though perhaps able to read or write after a fashion and do simple sums, will probably display scanty knowledge of current events and of matters of everyday life; he may know that the King's name is George, but not which George is King; the difference between a county and a country is beyond his power of defining; given his age and the current year, he cannot calculate the year of his birth; he can make nothing of a time-table or a football or cricket fixture card; or

he sees no difficulty about taking a train all the way to Paris. As for the children, it is perhaps worthy of note that the education authorities use the term " mentally defective " to describe those whom the Mental Deficiency Act places in the subdivision " Feeble-minded," and that from the educational standpoint the mentally defective child is defined as, on the one hand, not imbecile, and, on the other, not merely dull or backward.

We must consider somewhat more fully the state of the moral imbecile. The term " imbecile " as here used has not in practice the same meaning as in the second group of cases, though the words " incapable of managing themselves or their affairs " are sufficiently general to include it. In the first three groups the defect is primarily one of intelligence, whereas it is a debated point whether moral imbecility is necessarily associated with any defect of intelligence at all, though difference of opinion on this point is probably due chiefly to different views as to what constitutes intelligence. There are people in the world who seem to have been endowed with a double portion of original sin; people who steal or bear false witness or break any other of the Ten Commandments, whenever they feel so inclined. In the old days these people would all have been called criminals, and treated accordingly. All of them are vicious in that they satisfy the need of the moment without counting the possible cost. But modern civilisation discriminates. If a person in committing a crime shows such a lack of appreciation of the relation of cause and effect that he takes an undue risk of being found out and punished, he is regarded as not being responsible for his actions, and therefore not deserving of punishment at all. If he has been doing this sort of thing all his life, he is called a moral imbecile. The failure to estimate consequences at their true value may be regarded as due to a defect of intelligence, but in other respects the moral imbecile may pass muster quite successfully. He may make satisfactory progress at school or college until he is turned out for pilfering or sexual depravity; he may get on in business until he forges his employer's name or is detected in falsifying accounts; he may be socially quite a genial companion until he tries to levy blackmail; women may think him charming until they find that he has been married several times already. He is, in fact, entirely selfish. Such emotions as shame, repentance, gratitude, tenderness are foreign to his nature, though he may think it worth while to imitate them.

According to their more characteristic vices, one may distinguish some four types of moral imbeciles.

1. The skulking. These are the "workshy," the beggars, the malingerers, and the rest of those who are always finding some excuse for dodging their responsibilities. Meanness and cowardice are their distinguishing marks.

2. The mendacious. These are the liars and thieves, who cannot be trusted to keep promises, to pay their debts, or to recognise on the part of those with whom they come in contact any rights in property of any kind. Though unscrupulous, they are often well-mannered and plausible.

3. The sexual. These show no respect for the ordinary conventions which regulate the relations of the sexes. In the gratification of their desires they impose upon themselves no restraint, and they display various perversions of the reproductive instinct.

4. The contentious. These are the persons with persistent grievances and a revengeful temper, who make the lives of their relatives and friends miserable by threats, abuse, and general ill-will; who do not hesitate at slander and perjury, and who accept with avidity any malicious suggestion that enters their minds.

Another classification arranges moral imbeciles as follows:

A. Those in whom there is a defect of moral sense which may be—

(i.) Due to a natural absence of that quality;

(ii.) Due to influences which have interfered with its normal development.

B. Those in whom there is a defect of will, which may be—

(i.) General;

(ii.) Of the nature of an obsession or uncontrollable impulse, as in the kleptomaniac or the dipsomaniac.

Either the defect of moral sense or the defect of will may be regarded as a "mental" defect, and the particular case thus brought within the definition contained in the Mental Deficiency Act.

Education authorities, as mentioned incidentally above, have to deal with a type of child who is to be regarded not as "mentally defective," but as "merely dull or backward."

Such children attend ordinary schools, and do not, in the usual course of things, come under the notice of institution nurses. Nevertheless, some reference to them seems desirable. Where

their special needs are not recognised and provided for they hamper the whole class, and though they may be moved upward from standard to standard as increasing age or size makes them unsuitable to associate with children at their own mental level, they are all the time getting more and more in arrears.

Their difference from normal children may take many forms. They may be sluggish, irritable, restless, sullen, obstinate, soon tired, lacking in application and initiative, easily moved to tears, fanciful, wayward, under the dominion of some imperative idea, or even subject to delusions. Sometimes there may be found, if it is carefully looked for, evidence of definite nervous disease, as chorea or hysteria, or some slight affection of a sense organ may be the disturbing influence. In some instances it may appear, as the result of an investigation on psychological lines, that the fault lies in a particular field, as of memory, or attention, or the association of ideas, and suitable means of exercising the defective faculty being adopted, the whole mental machinery may be brought into harmonious working.

Of late years it has been felt that the rather crude, if convenient, methods of distinguishing between groups of mentally defective persons which have so far occupied us are capable of being replaced by something a little more scientific—*i.e.*, something which will enable results to be stated with greater accuracy. It seems fairly obvious that the best way of learning about mental defect is to study "mind."

In Section VIII. of this book an account is given of what is understood by "mind." A defective mind would naturally be one lacking in the elements, or carrying on wrongly the processes therein described, and if these elements and processes were not so difficult to define, a scientific scheme of mental defect would be easily drawn up. The matter is, in fact, by no means simple, and all that we can do as yet is to apply certain tests to those parts of the mind which can be reached. Such information as we have been able to acquire about sensation, perception, the association of ideas, memory, reasoning, the emotions, the will and so forth, has not proved sufficiently precise to enable us to deal with each of these elements or qualities independently, and the only firm ground so far discovered is afforded by what is called "general intelligence." Various methods of testing this have been devised, but even the best of them do not supply us with anything more than a means of comparison between the general

intelligence of the normal person and that of the mentally defective. The normal intelligence passes through an evolution difficult to observe during the first few months of life, and apparently ceasing about the age of sixteen or seventeen years. By marking off its stages periodically as it occurs in normal persons, we get a notion of what is appropriate to the average mind at one, two, three, four, and so on, years. If evolution takes place abnormally slowly, which is what we assume to happen in the mentally defective, the stage which should be reached at, say, four years, may not be reached until the fifth, sixth, seventh, or later year. This is the general principle upon which measurements of intelligence are based. To apply it one must begin by erecting the necessary standard—that is to say, by defining the normal condition of intelligence as met with at the various ages. It must, of course, be remembered that even children regarded as normal vary a good deal in the rate and order of development of their mental faculties, and that the scheme which follows must only be taken as representing an average condition of affairs.

It may be inferred from observation of the newly born child that the capacity for appreciating sensations is fairly well marked. Obviously, the child can experience hunger and thirst, the position in which its body is placed, sufficiently wide variations of the temperature of its surroundings, touch, and pain. It can perform purposeful movements such as those of crying, grasping, and sucking, which require a proper working together of groups of muscles. Cutaneous sensibility, the sense of position, the muscular sense and the " organic " sense, are therefore all present. By the end of a week the senses of vision and taste are beginning to carry on their functions. At a month the sense of hearing seems to have come into play, the capacity for appreciating differences of temperature has increased, and the eye can not only appreciate light, but it can " fix "—that is, it can look at, a bright object. At two months vision has improved sufficiently to enable estimates of the distance of objects to be made by the child, or so, at any rate, its behaviour leads us to suppose; and there appears to be present a power of distinguishing between musical tones. Smiling has been noted at this age, which suggests that " affection," using this word in the special way current among psychologists, is present. When four months old the child begins to " take notice "; it seems to

associate ideas—*e.g.*, those arising from seeing and hearing its parents; it discovers its hands; on the emotional side, it shows itself capable of anger. At six months it shows signs of recognising objects—*e.g.*, its toys, so that association of ideas would seem to be well established; it takes a lively interest in what is going on about it, and makes efforts to seize things and convey them to its mouth; it discovers its feet; it makes sounds among which both vowels and consonants may be detected. At nine months it can sit up unaided, and get about by crawling, rolling, or hitching itself along in the sitting posture. At twelve months it is beginning to get about on its feet; to use a few of the simplest words; to point to objects named; to imitate movements; to scrawl with a pencil; to indulge in demonstrations of affection towards its parents and, if suitably trained, to obtain control over its evacuations.

During the second year the vocabulary is largely increased, and the child begins to make up simple sentences; it becomes able to point to named objects in a picture, to copy a circle, to take a piece of chocolate out of its wrapper, to distinguish colours from one another; elementary reasoning processes are observable; the identity becomes recognised, and the child ceases to speak of itself in the third person.

Even at the age of three years the structure of the mind is so complicated that it cannot be set forth adequately in terms of sensation, perception, and memory. It is not even practicable to adopt what is called an " absolute " scale—that is, to compare the minds of persons of different ages by measuring their degrees of difference in regard to one particular faculty—*e.g.*, the different degrees to which they associate ideas or through which their emotions range. For this age and the succeeding ones, it has consequently been found best very largely to disregard theoretical considerations, and to measure intelligence by such tests as have been found by experience to be most convenient for any particular age.

In 1908 two French scientists named Binet and Simon published a scale of tests, graded from three to thirteen years, founded upon the examination of normal children of the corresponding ages. As the result of further study of the matter, a revised and extended scheme was published in 1911, and this is what is generally known as the Binet-Simon Scale. Since then many workers have criticised and tried to improve the method,

the most satisfactory version of it being probably that devised by Professor Terman. An account of this follows, but it is only practicable here to indicate briefly the nature of the tests, a perusal of Professor Terman's book being necessary if one wishes to obtain a thorough knowledge, not only of how to apply them, but also of how to estimate the value of the answers received.

For each age from three to ten years inclusive, for the age of fourteen years, and for each of the grades "average" and "superior" adults, there is given a set of six tests, while for twelve years eight are given, making seventy-four in all. In addition, sundry alternative tests are given for use when, for any reason, one in the regular series is inappropriate. The tests are not all of the same kind for each year, nor are all the tests of different kinds, so that a test of a particular kind may be adapted for use at several different years or may only be employed at one stage. This would seem to detract from the value of the comparison between different years, but in practice it is not of much importance since what it is desired to institute is a comparison between individuals of the same age. The more general tests are the repetition of numbers (digits) or syllables; the description of pictures; drawing from a copy or from memory; counting forwards or backwards; answering questions based on little problems in arithmetic or morals or common sense; the use of a vocabulary, and so on.

The table on pp. 550, 551 shows the scope ofthe tests. In the first column the age is stated, and the six subsequent columns indicate the nature of the tests employed. A normal child will, as a rule, be able to meet the tests assigned to its age.

This table is no more than an incomplete index of the full scheme. It will, however, serve to indicate the lines on which the examiner works when investigating a child's mental development. The underlying principle is that, by noting which year's tests a child of a particular age can satisfy, the examiner obtains a measure of the extent to which, if at all, the child is mentally retarded. Actual use of the scheme presents difficulty in that the person examined rarely fits into it exactly. It does not usually happen that a child is able to answer all the questions asked, or do all the things he is told to do, up to a certain point, beyond which he fails at every test. He may, for example, miss only one test at the six-year level, do a couple of those for seven years, and one of those for eight years. The rule for dealing

Age.	1	2.	3.	4.	5.	6.
3	Indicate nose, eyes, mouth, hair	Name familiar objects—*e.g.*, key, penny, knife	Name three objects in a picture	Know whether boy or girl	Know surname	Repeat a sentence of six or seven syllables
4	Compare length of two lines	Discriminate between such forms as circle square, triangle, etc.	Count four pennies	Copy a square	Say what to do if sleepy, cold, or hungry	Repeat four digits
5	Compare two weights	Name the colours, red, blue, green, and yellow	Distinguish between pretty and ugly faces	State use of articles like chair, horse, fork, doll	Fit together two halves of a visiting card cut diagonally	Carry out three simple instructions given at the same time
6	Distinguish right from left	Complete unfinished pictures	Count thirteen pennies	Say what to do in certain circumstances	Name four coins	Repeat a sentence of sixteen to eighteen syllables
7	Say, without counting, the number of the fingers	Describe pictures	Repeat five digits	Tie a bow-knot	Give from memory differences, as between a fly and a butterfly	Copy a diamond-shaped figure
8	Way to search for a lost ball in a field	Count backwards from twenty to one	More difficult "say what to do" questions	Give from memory similarities, as between wood and coal	Define things named better than by merely stating their uses	Define twenty words from a certain list

9	State the day, month, and year	Arrange in order five weights	Give change	Repeat four digits reversed	Make up a sentence so as to include three given words	Find rhymes to given words
10	Define thirty words from list mentioned	Detect absurdities in certain statements	Draw two given designs from memory	Remember points in a special passage read	More difficult problems in conduct	Say sixty words in three minutes
12	Define forty words from the list	Define abstract words, as pity, revenge	Better way than for eight years of searching for the lost ball	Arrange in proper order the jumbled words of sentences	Interpret certain fables	Repeat five digits reversed
14	Define fifty words from the list	Work out the rule for finding the number of holes made by cutting folded papers	Differences between a king and a president	Problems of inference	Problems of arithmetic	Imaginary reversal of hands of clock
Average Adult	Define sixty-five words from the list	Interpretation of fables	Differences between abstract terms	Problem of enclosed boxes	Repeat six digits reversed	Use of a code
Superior Adult	Define seventy-five words from the list	Draw appearance of a paper notched after various foldings	Repeat eight digits	Give substance of a passage read	Repeat seven digits reversed	Measuring seven pints with a three-pint and a five-pint vessel

The seventh and eighth tests for twelve years involve, respectively, the interpretation of pictures and the recognition of similarities in groups of three things.

with this sort of case is to credit the child with the last year at which he answers all the tests, and then add to this age two months for each test passed up to and including ten years and, for the subsequent stages, periods of three, four, five or six months respectively for each test. Thus, in the example quoted, the intelligence age would be arrived at by adding together 5 years and 10 months and 4 months and 2 months, or 6 years and 4 months in all; while if a person did all the tests for 10 years, 6 for 12 years, 2 for 14 years, and 1 of those for the average adult, his score would be 10 years and 18 months and 8 months and 5 months; total 12 years 7 months.

While it is obvious that the procedure outlined above constitutes a considerable advance on the old rule-of-thumb methods, it must not be supposed that it embodies any high degree of mathematical accuracy, and perhaps its worst feature is that many persons are misled into thinking that it has that merit. One does not know how much of the mind the "intelligence" measured by this scale represents. That it does not represent the whole mind is shown by the fact that a person of, say, sixteen years of age, whose intelligence age is seven, takes up quite a different attitude towards life from that of a normal child of seven years. Two things enter into the notion of intelligence which we obtain in this way—the capacity for learning and the amount learned.

Binet and Simon state that their object in devising the tests was "to bring to light the intellectual capacity of the child, taken by itself, as distinct from what the child actually knows." It may be questioned whether they have met with much success in achieving their end. Nor does it appear that "intelligence," the quality measured by the scale, has any simple relation to the various aspects of the mind which are treated of in the section on psychology. It has been found, for example, that acuteness of the sense of touch, or the power to discriminate between weights, does not increase with the intelligence of the person examined, although there is some "correlation," as it is called, between intelligence and the power to discriminate between the pitch of two sounds or the length of two lines. Similarly, there is little correlation between intelligence and perception, although there is a good deal between intelligence and memory, the association of ideas, and, especially, voluntary attention.

There are, too, several points in regard to age which have to

be considered. We have the age as stated in years, which may be called the " chronological " age. But children do not all grow at the same rate, so that one of ten years, for example, may be no further advanced as regards physical development than another of eight years. There is thus an " anatomical " age to be allowed for. The age reached in the intellectual development, as indicated by the table of tests, may be called the " intelligence " age. At first it seemed sufficient to define the degree of mental defect by stating merely how many years below the " chronological " or life age the " intelligence " age fell, but the value of this interval clearly varies at different parts of the scale. Other things being equal, if of two competitors one is inferior to the other, the longer the race the greater the distance he will be beaten by. If A can cover six miles while B covers two, A will be not four, but eight, miles ahead by the time he has gone twelve miles.

In the same way, to be behindhand intellectually to the extent of two years is a much more serious matter at six years of age than at sixteen. Recognising this, Binet and Simon laid it down that " the retardation which determines a child as a defective is two years when the child is under nine, and three years when he is past his ninth birthday." A more satisfactory way of overcoming the objections raised on this score is, instead of taking the difference between the " intelligence " age and the " life " age, to take the proportion which they bear the one to the other. In the example given above, A's speed is three times that of B, and we get the proportion or ratio by doing the little division sum, $\frac{6}{2}$.

Similarly, we can state the relation between intelligence age and life age by the fraction $\frac{\text{Intelligence Age (I.A.)}}{\text{Life Age (L.A.)}}$, and as the answer to a division sum is called a quotient, the answer to this particular sum is called the " Intelligence Quotient," so that we have the simple formula—

$$\text{I.Q.} = \frac{\text{I.A.}}{\text{L.A.}}$$

which, if the known quantities I.A. and L.A. are entered, will give us a fraction showing the relative intelligence of the particular case as compared with the normal.

We have now to apply information yielded by the Binet and Simon tests to the question of diagnosis. We see at once that our results have practically no bearing on the subject of moral

imbecility. They do, however, help to clear up the conception of the other three forms of mental defect. As regards the limits to be set there may be individual differences of opinion, but according to Terman the adult idiot would range up to the three-year level, the adult imbecile come between three and seven years, and the adult feeble-minded person between seven and eleven years. Stated approximately, in terms of the intelligence quotient, it may be said that those in whom the I.Q. is less than a quarter are idiots, those in whom it is between a quarter and a half are imbeciles, and those in whom it is between a half and three-quarters are feeble-minded.

From this stage one passes through diminishing amounts of dulness to the normal and onwards to various heights of superiority. The original Binet-Simon Scale was of little use in the slighter degrees of mental defect. It failed, indeed, to supply help where help was most needed for it is naturally in regard to the cases which most nearly approach the normal that one has the greatest difficulty in detecting a defect; and in practice this interferes with obtaining control over the persons who, in the public interest, are most in need of it. The Terman revision is more satisfactory, but there is still room for the exercise of ingenuity. Burt has done something to fill the gap by providing a graduated series of reasoning tests adapted for ages from seven to fourteen. As examples, we may take the following:

At seven years: " Tom runs faster than Jim; Jack runs slower than Jim. Who is the slowest, Jim, Jack, or Tom ?"

At nine years: " Three boys are sitting in a row: Harry is to the left of Willie; George is to the left of Harry. Which boy is in the middle ?"

At twelve years: " I started from the church and walked 100 yards; I turned to the right and walked 50 yards; I turned to the right again and walked 100 yards. How far am I from the church ?"

At fourteen years: " John said: ' I heard my clock strike yesterday ten minutes before the first gun fired. I did not count the strokes, but I am sure it struck more than once, and I think it struck an odd number.' John was out all the morning and his clock stopped at five to five the same afternoon. When do you think the first gun fired ?"

Two other tests giving indications of the mental age may be noted. Both serve to mark off approximately the level of seven to eight years.

1. *Goddard's Adaptation Test.*—A piece of hard wood about 1 foot long and 8 inches wide, having the two sides alike, and thick enough to prevent warping, has four holes bored in it symmetrically. Three of the holes are about 2½ inches across, but one is a little larger, though not noticeably so. A plug which exactly fits the largest hole, and which is consequently too big for the others, is provided. Having learnt which is the only hole which the plug will fit, a child of sufficient intelligence will at once find the hole again if its position is altered by turning the board over or round, while a child of lower degree will try to put the plug into the hole which is in the position originally occupied by the largest one.

2. *Demoor's Test.*—This is of special interest, because it brings out, incidentally, the fact that a normal mind is capable of being deceived by the senses, whereas an abnormal one may not be. It rests on an illusion, so that one answers the tests correctly by making a mistake. Two bottles of similar pattern and weight, but one obviously larger than the other, are shown to the person tested, who is asked to lift first one and then the other and say which is the heavier. To a mind above the level of about seven years the smaller one seems the heavier, while at a lower level the larger one is usually selected as the heavier if any result at all is obtained.

In addition to those already mentioned considerable numbers of tests have been devised by various persons to investigate various aspects of mind. A brief account of a few will be given to enable the nurse to recognise and understand their purport, if he comes across them in the course of his work.

(*a*) *Bourdon's, or the Cancellation Test.*—A piece of print consisting of equally spaced letters distributed irregularly, as in the example given below—

B C H I N T W Y B C H I
N T W Y B C H I N T W Y
H I N T W Y B C H Y T T
N T W I Y B C H I N T W
Y B C H I N T W Y H T N
T W B I H T C N H W I B
W Y H C B I N T W Y B C
Y W T N I H W C B Y I W
I C H N W B C T H I T B
G T W C H B T I Y T Y I

is put before the person to be tested, and he is asked to cross out as quickly as possible all the examples of a particular letter.

This has been used as a test of perception, but as the results obtained are dependent both on speed and accuracy, it is difficult to establish a standard of comparison.

(*b*) *The Ink Blot Test.*—This affords evidence of the subject's power of imagination. A drop of ink is thrown on a piece of paper of not too hard a texture, and the paper is folded once or twice in different directions through the blot. As the ink spreads on the inner face of the folds irregularly, the blot assumes some fantastic shape, and the person under test is invited to say what the shape reminds him of.

(*c*) *The Dotting Test.*—This is supposed to measure both the capacity for attending and the general motor ability. A paper tape marked with small circles, so arranged that although at equal distances apart they occur at various distances from the edge of the tape, is passed at a known rate before a slot. As each circle appears one tries to put a dot in the middle of it.

(*d*) *The Cube Test.*—A 3-inch cube of hard wood which has first been painted all over is cut into twenty-seven 1-inch cubes. These are to be fitted together again to make the original cube.

(*e*) *The Maze Test.*—Simple forms of maze are printed on paper or engraved on a slate, and the child is asked to trace the way out with a pencil, credit being allowed for freedom from mistakes.

(*f*) A list of abbreviations arranged in the order of decreasing familiarity is shown, and it is noted how far down the list the patient can get.

(*g*) The patient's measure of success in dividing into three equal parts areas of different shapes—*e.g.*, square, triangle, pentagon—may be studied.

(*h*) Five pieces of a simple chain, each of three links, are shown, and the patient is asked how he would make them into a single length of chain without opening and closing more than three links.

(*i*) As a test of will-power, the subject is invited to stand as long as he can with his heels slightly raised from the ground.

(*j*) As tests of the moral faculty, the subject may be asked his opinion of certain actions which involve moral questions, as, for example, what he would do if he found something of value, or if he received too much in change when buying something.

With the exception of (*e*), in which mazes of varying degrees of difficulty are employed, these tests have not been standardised on the age basis. Making a diagnosis involves distinguishing particular abnormal states, not only from normal ones, but also from others equally abnormal, but not having the same significance. In the case of the mentally defective there are two principal fields in which misleading resemblances may be met with —that of insanity and that of the temporary divergences from the ordinary standards of conduct which may accompany certain stages of development.

(A) The Relations of Mental Deficiency and Insanity.

Although with some reason we have assumed that there is a clear distinction between mental deficiency and insanity, and have used this assumption as a first step in classification, such a distinction is, in fact, very largely artificial. Insanity, like mental deficiency, appears to have as its main cause an abnormal germ plasm, but the abnormality does not show itself at as early a period of life as does that existing in the mentally defective.

All the signs and symptoms of nervous and mental disorder which are described in Section X. may be found on occasion in the mentally defective, and states of exaltation or depression, hallucination or delusion, resistiveness or inertia, occur as in the insane. It may be impracticable at first to distinguish a moral imbecile with imperative ideas from a lunatic, or a case of dementia præcox from a feeble-minded person, while a case of juvenile general paralysis may be placed on either side of the dividing-line. Moreover, mental deficiency, like insanity, tends to terminate in dementia.

As with persons who are not weak-minded, the insanity which occurs amounts to a departure from the individual's ordinary mode of life, and may be caused by some emotional disturbance, as, for example, fright or undue excitement, or by alcohol, to the effects of which the mentally defective show great susceptibility. The attack may persist or, if it passes off, may recur just as with ordinary lunatics. No useful purpose would be served by repeating what has been said in previous sections about the forms of insanity. The nurse should read those sections so as to get a general idea of their purport, even though he is not expecting to be formally examined on them.

(B) Temporary Aberrations.

Considered as a study in physiology, the living organism has two main functions to perform: (1) To go on living; and (2) to reproduce its like. Even when development takes place on strictly normal lines these two functions do not follow parallel courses. From the cradle to the grave there is a fairly uniform process of stoking the bodily fire until it burns itself out, but the power of reproducing the species does not appear until several years after birth, and it ceases some years before death, if that takes place from the simple decay of old age. In the human race there is a marked disturbance of the bodily and mental states when, at the time of puberty (as it is called on account of the associated special growth of hair), the reproductive organs assume their functions, and a somewhat similar dislocation of the routine of life occurs at the climacteric, when those functions fall into abeyance. The aberrations which may occur at either period may raise doubts as to the sanity of the individual concerned, but as the mentally defective usually come under notice young, puberty is the state in which irregularities in the mental processes are more likely to be confused with mental deficiency.

What distinguishes the conditions originating in puberty is that they show disorder of conduct rather than of intelligence, and that they are not of a permanent character. Restlessness, self-conceit, irritability, untruthfulness, obscenity, spitefulness may occur, and there may be the carrying out of actual crimes, such as theft or arson, or an utter disregard of the conventions in regard to sexual matters. Cases of this kind resemble the moral imbecile type of mentally defective persons, from which it may be impracticable to distinguish them, until they demonstrate their ability to reform.

CAUSATION.

To the nurse as such the causes of mental defect are of only secondary importance, and this is fortunate, since the subject is so largely speculative in character that there is little in the way of firmly established fact to which his attention can be directed. At an early period of his training he may be inclined to accept various old wives' tales, and see no great difficulty in supposing that the large head of the hydrocephalic is due to the mother's having dreamt that she was a balloon, or that the facial

aspect of a cretin results from her having paid an untimely visit to the Zoo. He may also consider plausible the suggestions that a healthy child developed mental defect in consequence of vaccination or dog-bite.

With increasing knowledge of the brain and its functions, he will no doubt cease to believe in absurdities of this sort, and be prepared to accept teachings about the effects of alcohol or tuberculosis, or venereal disease, which even though they have not much more foundation, are yet more dignified. From his own observation, as he acquires experience, he will probably arrive at the conclusion that the old adage, " like father, like son," has a good deal to do with the matter, and therein he is probably correct. Heredity, indeed, seems more than any other principle to explain the occurrence of mental defect. In some cases this explanation fails, and it will usually then be possible to trace some less remote cause, as, for example, an injury to the brain, or the occurrence of some disease which may reasonably be expected to produce such results as are observed. The modern view is, then, that in the production of mental defect there are two elements or factors, heredity and environment, which may act together or independently, but which in practice are not readily to be separated. So far as mental defect is distinguishable from insanity, it appears that heredity plays a more pronounced part in causing the former than in causing the latter. This is to be expected, since mental defect appears earlier than insanity, and consequently when the environment has had less time in which to produce its effects. The conditions of the environment which are believed to be responsible for mental defect are not quite the same as in the case of insanity. One must, therefore, consider the matter briefly from the special standpoint of the worker among the mentally defective.

A general scheme of causes of mental defect may be arranged somewhat on the following lines:

A. **Innate, intrinsic, or hereditary causes**—*i.e.*, causes depending on the anatomical and physiological characters of the " germ plasm " from which the individual develops.

1. *Neuropathic States.*—The germ plasm derived from parents, one or both of whom suffer from mental defect, insanity, epilepsy, or nervous diseases generally, is likely to develop into an individual showing a neuropathic tendency—*i.e.*, a tendency towards mental or nervous disease. The disease in the child does not

always take the same form as in the parent—*e.g.*, the child of an insane parent may be feeble-minded, the child of a feeble-minded person may be epileptic, and so on. As might be anticipated, if both parents have the neuropathic taint, the chances of its appearing in the child are greatly increased. Thus 134 matings of feeble-minded persons yielded 482 children who lived beyond infancy, and all but six of them were feeble-minded.

Researches into the history of mentally defective persons, which have been made especially in America, supply evidence which confirms the importance of the neuropathic tendencies. We have, for example, the case of the Kallikak family, in which two series of descendants of Martin Kallikak were traced through six generations. One series had its origin through a feeble-minded woman, the other through a woman of normal mental constitution. The first series included about 480 persons, concerning 187 of whom fairly precise information is available. This shows that 143, or about 75 per cent., were feeble-minded, while illegitimacy and drunkenness were common among them. In the other branch of the family, numbering nearly 500 descendants, feeble-mindedness and illegitimacy were unknown, and only two were confirmed alcoholics. Another instance is that of the Hill Folk, a family living in the State of Massachusetts, of which 700 members were known, 48 per cent. of them being feeble-minded. Recently there has appeared an account of a group of persons living in the State of Minnesota, not all members of one family, but belonging to a small community where interbreeding had taken place freely. Thus we learn of a feeble-minded woman giving birth to 11 children, of whom 3 died shortly after birth, and the rest were feeble-minded; or of 11 children of an alcoholic father and feeble-minded epileptic mother, of whom 2 died young and only 1 was normal. Of 613 persons in this group it was recorded that 199 were feeble-minded, 34 insane, 125 sexually immoral, and 134 excessive drinkers, only 156 conforming to the ordinary standards of intelligence and conduct. That the total exceeds 613 is due to the fact that one defect or vice does not exclude another. The figures thus serve also to bring out the relationship between the different forms of abnormality.

2. *Consanguinity of the Parents.*—The marriage of blood-relations is said to lead to the production of mentally defective offspring. It seems likely that no such result follows except

where there is in the parents a strain of mental or nervous weakness. In such a case, as we have just seen, the prospect of defect in the child is naturally intensified by the double inheritance.

3. *Age of the Parents.*—The germ plasm transmitted by the sex cells of the parent probably passes through stages of development parallel with those of the body containing it, and will not be at its best at the extremes of life. Very young or very old parents may therefore contribute an immature or deteriorated germ plasm to the making of their offspring. Whether or not they, in fact, do so seems open to question.

4. *Order of Birth of Parents.*—It is said that if there is in a family a hereditary taint, the first-born children are the most likely to transmit that taint, even though they do not show it themselves.

B. **Extrinsic, acquired or environmental causes**—*i.e.*, causes originating in the conditions in which the germ plasm develops. They may be divided up according to the period during which they are effective.

1. *Ante-natal Causes.*—Those acting before birth. It must be remembered that for some nine months before birth the child is living, and capable of being acted upon for good or ill either directly or through influences affecting the mother. A confused recognition of this fact is no doubt the origin of the stories of "maternal impressions," such as those already alluded to, which have a certain vogue among the uneducated. It is probable that the mental condition of the mother has no direct bearing upon the development of the child, though her bodily health may have, inasmuch as it affects her nutrition and consequently that of the child dependent for its food supply upon her. The child may sustain injury in various other ways, as by an accident to the mother or by attempts to bring about its premature birth, either by the use of instruments or drugs.

2. *Natal Causes.*—Those acting during birth. Probably the only one worthy of serious notice is a protracted confinement resulting in actual injury to the child's brain.

3. *Post-natal Causes—i.e.*, those acting after birth. Under this heading may be included, first of all, the agencies acting on the brain itself: Injury, as from a fall; the formation of tumours; the blocking or bursting of bloodvessels; sunstroke; inflammation of the brain or its membranes; the toxins developed in the course of infectious diseases. All these may cause lasting impair-

ment of the cerebral functions. There is some evidence also that emotional disturbance as, for instance, fright, or excessive mental stress such as may arise from over-pressure at school, may have a deleterious effect on the brain.

Affections of the sense organs, which are the channels of communication with the outside world, are hardly less important.

Apart from the cases referred to on p. 533 as examples of "idiocy by deprivation," it is found that among school-children serious interference with the power of acquiring knowledge is caused by defects in the organs of sensation, and particularly in those concerned with sight and hearing. Just as the lens of a camera throws on the screen of ground glass placed behind it a picture of the object towards which the camera is directed, so the lens of the eye throws on the retina or lining of the eyeball a picture of what is looked at. Without proper adjustment in both cases the picture may be hazy and ill-defined, or as we say, "out of focus." In the defects of vision which are called short sight or long sight or astigmatism, the natural machinery for focussing is insufficient, and has to be helped by means of "glasses." Deafness, too, may be a great handicap, and a child who is dependent chiefly on oral teaching in class may, through imperfect hearing, lose ground which it cannot later make up.

Less directly, other parts of the body exert an influence on the mental state. Disease of any organ or system of organs, or general enfeeblement, may prove an obstacle in the way of learning by preventing the available teaching facilities from being utilised.

Paralysis, or joint disease, or skin affections may cause absence from school, while other conditions may hamper the progress of a child who is able to attend. Of these latter, special importance attaches to the undue development of certain tissues in and about the pharynx, resulting in the production of large tonsils and the growths known as adenoids. These act injuriously in the first place by obstructing respiration. In the second place, they seem to encourage the growth of disease organisms, and so give rise to persistent "colds" or to inflammations which may spread to the ear and cause deafness. In the third place, there seems to be ground for recognising a more immediate action on the mental state, giving rise to a certain stupidity and lack of the power of attention, to which the name aprosexia has been applied.

C. **Doubtful Causes.**—These may be so called because it is uncertain whether or not they play any part at all or, assuming

that they *do* play a part, because of the doubt as to whether they are to be classed as hereditary or as environmental.

1. *Alcoholism.*—It is no unusual thing to find that the parent of a mentally defective child is a drunkard, but the relationship of the alcohol to the defect is obscure. In an investigation it was found that in homes where a large amount of beer was consumed the children were brighter mentally than in other homes where the consumption was low. This proves nothing, except the folly of jumping to conclusions. What it means is probably that more beer was consumed because more wages were earned, and this implies, further, that the larger wage-earners were more intelligent. It is quite possible that if these more intelligent persons had consumed less alcohol the contrast between their children and the children of the more sober parents would have been even greater.

(*a*) A weakness for alcohol may be the particular form in which mental defect shows itself. In that case it is the strain of weak-mindedness in the parent which is handed on to the child, the alcohol playing the part not of a cause, but of a demonstration.

(*b*) Alcohol may act on the germ plasm or on the embryo as a poison, and so interfere with the child's normal development before birth.

(*c*) Alcohol may be given directly to the child after birth, and this is probably done more often than is generally supposed.

2. *Tuberculosis.*—This disease appears to be more frequently met with among mentally defective persons and their families than among the mentally normal. The reasons for this association can, as yet, only be guessed at; the relation may not be one of cause and effect at all.

3. *Syphilis.*—By setting up inflammatory processes in various organs, including the brain and its coverings, syphilis may interfere with the proper development of the mind. Although it is usual to talk of hereditary or congenital syphilis, it is probable that as a cause of mental defect it must be assigned not to Group A, but to Group B, the disease being acquired by the defective person either before or at birth from the mother, or after birth from some independent source. It does not follow that because both syphilis and mental defect are present in the same person the former is the cause of the latter. It is, indeed, very doubtful whether there is more syphilis among the mentally defective than among those who do not fall into that category.

4. *Epilepsy.*—The case of epilepsy is in some respects the opposite of that of syphilis. Because, so far as we know, the child does not suffer from fits before it is born, epilepsy is regarded as acquired. Properly, if it is a cause at all, it should be included in Group A. In all probability it is merely an aspect of abnormality in the germ plasm, like mental defect.

5. *The Endocrine Glands.*—As the functions of these become better known it becomes more likely that they play an important part in the control of growth. Disorders affecting them may consequently be of profound significance as regards the mental processes, although that significance is at present not fully understood.

In certain instances the difficulty of defining the cause of a defective mind may be greater through the development of what is called a " vicious circle," in that the original defect may be responsible for placing the individual in circumstances which tend to increase it. It is of interest to compare this scheme of causes with the classification of types given on pp. 530–532. That classification is not based on any one principle, but assumptions, more or less well founded, as to the cause of particular types of abnormality, have been an important factor in its production. The traumatic, inflammatory, syphilitic, cretinoid and deprivation forms are so named irrespective of their mental characteristics, because they are believed to have followed on injury, fever, syphilis, cretinism or imperfection of sense organs. As regards the eclampsic, epileptic, and paralytic forms there is an implication that the occurrence of fits or paralysis is responsible, while in the first five groups the matter is left open, and the anatomical characters are employed without any pronouncement as to how they originated.

TREATMENT.

The treatment of forms of mental disorder differs from that of disease generally in that the agencies concerned in it are not purely medical. Sufferers from ordinary illness are usually incapacitated by it in a way which makes them willing to retire from the daily round, whereas the sufferer from mental trouble displays as his most important characteristic a tendency to obtrude himself upon the public notice, and to make himself a source of discomfort and annoyance to those about him. Some measure of restraint is consequently required, and the obtaining

of this raises legal and social questions which may overshadow in importance the medical ones.

It will conduce, on the part of the nurse, to a clearer conception of the mentally defective persons with whom he comes in contact if he learns something of the procedure which has brought them under his charge. In 1601 an "Act for the Relief of the Poor" made those who were unable to look after themselves, which class naturally included mentally defective persons, a charge on the State, and since then, through the agency of the Poor Law, Education Acts, Lunacy Acts, the Idiots Act, and the Mental Deficiency Act the powers of curtailing, in the public interest, the liberty of the mentally defective, have been gradually widened and strengthened. These powers can perhaps be most conveniently considered under the headings referred to.

1. **The Poor Law.**—(*a*) In 1875 the Local Government Board authorised the admission into asylums provided under the Metropolitan Poor Act of 1867 of imbeciles in regard to whom a certain procedure was followed, this procedure undergoing a slight alteration in 1890. As these cases are certifiable as lunatics, and as without such certification they cannot be detained, it has become customary to get them certified in the way referred to in paragraph 3 below.

(*b*) By an Order issued in 1911 authority was given for the admission of higher-grade cases—*i.e.*, the feeble-minded, who are not certifiable as lunatics.

(*c*) The Poor Law Acts of 1889 and 1899 give Boards of Guardians power to adopt children in certain cases. If the children are mentally defective the Guardians are able to obtain institution care for them just as the parents could have done.

2. **The Education Acts.**—In 1899 there was passed the Elementary Education (Defective and Epileptic Children) Act, which empowered the school authorities to make provision for the education of children who, "not being imbecile, and not being merely dull or backward, are defective." A further Act of 1914, bearing the same title, made it compulsory for the authorities to make such provision "in the case of mentally defective children whose age exceeds seven years." The provision made under the Acts takes the form of special schools or classes, and may include the boarding and lodging of the children.

3. **The Lunacy Acts.**—Since the term "lunatic," as employed in the Lunacy Act of 1890, "means an idiot or person of unsound

mind," it is possible under the Act to get some mentally defective persons admitted into asylums for lunatics. Another section of the Act allows of their being sent from the asylum to a workhouse if they appear suitable for being dealt with in that way. The most important section of the Act, however, so far as the mentally defective are concerned, is the one numbered 24, which deals with lunatics in workhouses, because in practice many idiots and imbeciles are certified under it. In the London district this method has special interest because the large "asylums," built by the Metropolitan Asylums Board, and mentioned above in 1 (*a*), are covered by the definition of "workhouse" contained in the Act. Facilities for transferring cases from ordinary workhouses to these institutions are given by the Lunacy Act of 1891.

4. **The Idiots Act.**—This was passed in 1886, and it enabled facilities to be provided for the care, education, and training of idiots and imbeciles. These facilities were utilised in several large institutions, but the Act was repealed by the Mental Deficiency Act, and the institutions referred to became "certified institutions" within the meaning of the latter Act.

5. **The Mental Deficiency Act, 1913.**—As a result of the labours of the Royal Commission for the Care and Control of the Feeble-Minded, which issued its Report in 1908, there was passed in 1913 "an Act to make further and better provision for the care of feeble-minded and other mentally defective persons and to amend the Lunacy Acts." This Act is known as the Mental Deficiency Act, 1913, and it came into operation, in part on November 1, 1913, but, as to its main provisions, on April 1, 1914. When dealing with the question of diagnosis, we noted the classes of persons who are deemed to be mentally defective within the meaning of this Act, and it is not suggested that the four groups defined embrace all the possible varieties of mentally defective persons. Further, the defective, even if covered by one of the definitions, will only come within the scope of the Act if he satisfies certain conditions.

The case must fall under one of the following heads:

A. Idiots and imbeciles whose parents or guardians take action.

B. Cases not classed as idiots or imbeciles—*i.e.*, the feeble-minded and the moral imbeciles, if under the age of twenty-one and if the parent takes action.

C. Cases belonging to any of the four groups, if neglected, abandoned, without visible means of support, cruelly treated, criminals, habitual drunkards, paupers " in receipt of poor relief at the time of giving birth to an illegitimate child, or when pregnant of such child," or, finally, children whose cases have been notified by the education authorities.

Patients in Classes A and B are called " placed," and are dealt with in much the same way. A statement signed by the parent or guardian and two medical certificates are required, which certificates in Class B cases have to be endorsed by a " judicial authority."

Patients in Class C are dealt with " under Order," as it is called, and this Order may be in one of three forms. It may be made by a " judicial authority," as the result of a petition presented by " any relative or friend of the alleged defective, or by any officer of the local authority " duly appointed. Certain documents, including two medical certificates, must accompany the petition. An order of the second type is made by a court of justice, if the court is " satisfied on medical evidence " that the person charged with an offence is mentally defective. Orders of the third form are made by the Home Secretary, in cases where a person recognised as mentally defective is found undergoing imprisonment or detention in such an institution as a reformatory.

In whatever way he has been admitted into an institution, the patient's position has to be reconsidered periodically by the visiting justices. Provision for the reception of cases may be made in (1) " State institutions " for defectives of dangerous or violent propensities; (2) " certified institutions "; (3) " certified houses "; (4) " approved homes," or (5) private houses. Poor Law premises, like the asylums of the Metropolitan Asylums Board, already mentioned, may be approved as " certified institutions."

In considering the possibilities of treatment in regard to the mentally defective, it is necessary to recognise that the word " treatment " has here not quite the ordinary meaning, although its use in the special sense which is appropriate to the circumstances is quite legitimate. The administration of drugs and the performance of surgical operations have little relation to the problems presented by mental disorders, and they have even less importance in connection with mental deficiency than with insanity. Mentally defective persons are more liable than

normal persons to disease, and when it occurs it is treated in the customary way, with such modifications as are made necessary by want of co-operation or even by active resistance on the part of the patient. It is idle, for example, to attempt to persuade a hungry imbecile who is recovering from enteric fever that solid food is bad for him; it is more important to prevent him from eating his blankets. In particular instances the indications for drugs are clear enough. Hypnotics like paraldehyde may be required to overcome sleeplessness; bromides may be given to epileptics; preparations of thyroid gland to cretins; and so on, though in these matters the nurse's duty is confined to carrying out intelligently the instructions which the doctor gives.

From the nature of the case, a " cure " in the usual sense is generally out of the question, and " treatment " resolves itself into the care and control which are desirable in the patient's interest, and the education and training which are in the interest of the community. These two aspects of treatment are not, in practice, easily separated, and it is most convenient to deal with them together. In doing this certain principles appear, and it is well to have some general notion of these in order to bring out the things which really matter.

The evolution and growth of the mind are believed to take substantially the same course in all human beings, and the intelligence or capacity of the mentally defective is assumed to differ in degree and not in kind from that of normal persons. In other words, there is an unbroken series from the idiot to the person of superior intelligence. The difference between defective and normal minds is that in a given period they develop little or much and, therefore, at corresponding times they have arrived at different stages in their development. It is true, as we have already seen, that an adult whose intellectual age is that of a child differs mentally from the child, but that is partly because intelligence is not the whole of mind, and partly because the different mental elements may not develop at the same relative rates in different persons. In the development of the mind it appears that the reception of impressions by the brain, whether from the outside world or from one's own organs, is the first stage. The power of memory enables these impressions to be stored, so that the mind's capital is increased, and we get a growing fund of ideas which supplies the material for the exercise

of the reason. Whatever the age in years of a person, if his mind has not outgrown those early stages in which its business is merely to receive impressions from the sense organs, to expect anything more advanced in function from him is futile. It is possible to get some notion of what a child's capacity is, and therefore of what it is necessary to teach him. If he is left to his own devices he will indicate what he is interested in by turning to it instead of to something else which happens to be within the scope of his attention. But the opportunities which the child can make for himself in this way are few, and it is the teacher's business to provide him with a wider selection and observe the result. Having discovered what the child's mind can digest, the teacher then proceeds to feed it with suitable nourishment. In practice this means chiefly what is called training the senses, and one does this not so much because highly trained senses have by themselves any special value under modern conditions of civilisation, as because for the mind in its initial stages of growth this is the only way in which progress can be made.

One notes here that, although a distinction is usually drawn between sensory and motor activities, the former in effect include the latter, since it is on the muscular sense and the sense of position that properly controlled or, as they are called, "purposive" movements depend. The development of motor capacity in the child proceeds side by side with that of sensory capacity, and training must be directed to the encouragement of both. Such powers of memory as the child possesses must also be turned to account, and in so far as reasoning is possible this faculty must be exercised. These general principles may conveniently be considered in their application to the individual's life in (1) the home or ward; (2) the school; (3) the workshop.

1. **The Home Life.**—Whether in the ward of an institution or in a private house, the mentally defective person has much to learn in order that he may be fit to associate with his fellows, and that his imperfections shall be as little in evidence as possible. Tried in the special fields of school and workshop, he may prove to be so incapable of progress that to exclude him is the only course open; but he has to have a home somewhere, and in that home one has to make the best of him, since the dictates of humanity prevent his being consigned like a superfluous dog to a lethal chamber.

As already indicated, the science of biology teaches us that

the activities of living creatures are mainly devoted to the service of two interests, which may be stated briefly as (1) the perpetuation of the individual, and (2) the perpetuation of the race. The mentally defective person possesses in some measure the instincts necessary for these purposes, though these instincts may, in the idiot, be so poorly developed as to be insufficient for the maintenance of existence, unless strengthened by some outside agency, while in higher types of defectives the instincts, although not lacking in vigour, may be so perverted or misdirected as to fail in accomplishing their purpose.

(i.) In order that he may be kept alive a person has to be supplied with food, and protected from dangerous influences; and the problems of meeting these requirements will vary with the individual. Aspects of the food question which have to be considered are:

(*a*) The obtaining of food.

(*b*) The preparation of food for consumption.

(*c*) The consumption of food.

(*d*) The disposal of the waste matters resulting from the consumption of food.

The normal person can attend to his own wants as regards all these matters if need be. He can buy or perhaps grow his food, cook it, eat it, and dispose of his excretions without depending on anyone else. The mentally defective person can only carry through the necessary procedures with a degree of imperfection proportional to his defect of mind. The simple scheme outlined in (*a*) to (*d*) involves in practice a host of details, and it is the business of the nurse to attend to these when his patient is incapable of doing so or has not learned how to do it. As regards the provision of food, the nurse will find usually that his duty consists in ascertaining from a medical officer what is to be given to the patient, and then in obtaining from store or kitchen what is required. At the next stage, his energies will have a wider scope: he will have to get his patient to the table, perhaps furnish a bib or "feeder," supply him with all the necessary utensils and appliances, and see that they are clean and suitable —*e.g.*, that plates are hot, that there is water in the drinking-mug, salt in the salt-cellar, and pepper in the pepper-pot—and after the meal is finished leave everything clean and tidy.

What measure of interference is called for as the patient consumes his food will depend on the circumstances. A feeble-

minded patient may be able to use an ordinary knife, fork, or spoon in the proper way, requiring no more than a few hints, such as that the knife is not meant to be put into his mouth, or that in the best circles it is not usual to push food on to a fork with the fingers. Special knives with a shortened cutting edge may be desirable in exceptional cases. If the patient is unable to cut up food for himself this must be done for him. If, though the manipulation of knife and fork is beyond his power, he can use a spoon, let him do so. It may be that the food will have to be placed in his mouth, and in this case the nurse must see that the mouthfuls are not too big, and that one is disposed of before another is offered. Again, it may be that owing to the patient's suffering from fits, paralysis, or other illness, only fluid food can be safely given, and a feeding-cup may be necessary for the purpose.

No less important in the interests of the patient's comfort and that of his fellows is attention to the excretory functions. All degrees of defective control of bowels and bladder are met with, and since the trouble in the mentally defective is usually due to lack of training rather than to disease of the nervous system, it can be overcome in great measure. Like infants, defectives have to learn control, and for this purpose a habit of regular evacuation at intervals gradually lengthened should be formed. When this is done the patient will probably have acquired the practice of making his wants known in some way, so that prompt attention will obviate disaster. It is naturally desirable that his garments should be easily washable. At night, wet cases will require to be roused periodically according to what experience has shown to be the needs of each. Being roused does not appear to injure a child's general health, for he soon drops off to sleep again; the nurse must, however, see that he is not unduly exposed so as to incur risk of catching cold. Where bed cases have to be got up to the commode either by day or night, the nurse should not be too lazy to observe, as far as possible, the rules of decency, and should provide some sort of screen for the patient. In the case of one of so low grade that control of the bladder is never attained, it may be convenient to use, as with infants, some form of napkin, even for an adult. When the patient's bowels are continually relaxed, medical treatment may be required, and with the approval of the doctor an enema of warm water may be employed occasionally to empty the bowel for a few hours, and

so give the patient (and the nurse) an opportunity for rest. The abnormality of the function of evacuation may take another form —*i.e.*, there may be retention of the urine or constipation of the bowels. These require to be dealt with by the medical officer, but it is the nurse's duty to call his attention to them.

That the bodily machinery may continue running, there is required not only the provision of suitable fuel, but also the avoidance of any interference likely to cause a temporary or permanent breakdown. In a climate such as that of Britain, the food consumed, while it may suffice to maintain the weight and the power of movement, will not always supply sufficient energy to keep the temperature of the body up to the necessary level. Shortcomings in this respect are made good by warming the living-rooms and by the use of clothes. In regard to the former matter, the nurse is chiefly concerned to report to the proper quarter anything he notes lacking, but the dressing of the patients under his care will give him ample scope for showing his capacity. The clothing must be suitable as regards material and fit; it must be properly put on and taken off; it must be changed at suitable intervals, sent to the laundry, repaired, and stored. In his own interests and that of the nurse the patient should be taught to dress himself, to fold up and put away his clothes, and, as a side-issue, to make his own bed. To be neatly dressed has a moral effect in addition to being conducive to physical health. The supply of the equipment in the way of clothing will not, in an institution, be the business of the nurse, but he will be expected to check the equipment by means of his inventory, and he will be held responsible for any loss or damage arising through his neglect.

The patient's body must be kept clean as well as warm. As before, the main object in view is the avoidance of dangers to health. To see that a patient is properly washed in the morning, and later if need be; that he has a bath periodically; that his teeth are cleaned; his hair kept short and tidy; his nails trimmed; all these matters call for attention.

(ii.) The instincts concerned with the perpetuation of the race are probably less strongly developed in the mentally defective than in normal persons, but they are apt to be more in evidence owing to the lack of control over them, which is the result of defective will power. It is now recognised that the sex instincts begin to develop much earlier than used to be supposed, and

may manifest themselves in children in what are vaguely called "bad habits." Sometimes these are encouraged by the irritation due to badly fitting garments or to lack of cleanliness, and to that extent can be remedied by removing these conditions. With sufficiently intelligent patients something can be done by moral influence. In the case of a female patient, it is very important for the information of the medical staff that due record should be kept of the incidents connected with the menstrual function.

In a civilised community there arise problems of conduct involving issues of a more complex character than those already referred to. Of these, responsibility for one's acts and the attitude towards religious matters are deserving of brief consideration. Responsibility is of importance, because there is bound up with it the question of punishment. In so far as a person, knowing the nature of an act, does it although he knows it to be wrong, he is regarded as responsible, and the mentally defective show all grades of responsibility, and may properly be punished in proportion to their responsibility. In practice, however, the nurse will find it advisable to leave the award of penalties to his superior officers, as otherwise he may bring himself into conflict with the law. According to Section 55 of the Mental Deficiency Act, 1913, any nurse who "illtreats or wilfully neglects" a mentally defective person is guilty of a misdemeanour.

It is no defence if the nurse is found caning a patient for him to say that he is only treating the child as he treats his own children. How easily one may fall into error is illustrated by the case of moral imbeciles. These, owing to their intelligence, may appear obviously responsible, yet it is, as the legal definition shows, an essential characteristic of them that punishment has "little or no deterrent effect."

As regards religion, the position is that every patient, even the most hopeless idiot, is assumed to belong to some "religious persuasion." Quite a long section of the Mental Deficiency Act is devoted to this topic. Whatever the nurse's private views may be, it is his duty not to interfere in the relations between the patient and the officer whose province it is to attend to the religious education of the patient. Apart from any sectarian teaching, there are broad principles of morality common to most religions, and the nurse should confine his activities to these. He should not use foul language, or gossip about his fellow-

officers, or discuss racing odds in the hearing of his patients, nor should he lose his temper and threaten them with penalties which he knows himself unable to impose. If it is customary for grace to be said at meal-times, he should see that this is done with proper reverence. As a rule, a nurse will not be expected to attend with patients the services of a denomination to which he does not himself belong, but if such a call upon him should be made, he should show respect to those who minister even though he is not in sympathy with their teachings. To make a parade of intolerance by ostentatiously ignoring the ceremonial of a different creed is neither good manners nor sound religion. In cases of sickness it is very important to see that the proper religious authority is duly notified. It is a good plan to mark conspicuously on the case-card or chart the religious persuasion of the sick patient, so that there may be no chance of oversight. There are other aspects of the religious question of which the nurse must not lose sight. A professedly religious patient may be none the less a liar, a thief, bad-tempered, or generally vicious. He may make the exercise of his religion a pretext for escaping, as in the case of a boy who was allowed to attend the confessional. The religious views attributed to the patient may call for the arranging of a special diet, or may be an obstacle to the making of a post-mortem examination.

2. **School Training.**—By this is meant such training as is ordinarily given in schools, though the collection of the pupils for combined instruction is in no way an essential feature of it. Many of the earlier attempts at teaching, which have given us insight into methods and possibilities, were indeed undertaken with individual patients. For six years Dr. Itard, a pioneer in the education of the mentally defective, laboured with the "Wild Boy of Aveyron" (see p. 533), and though his efforts produced little result in this particular instance, they yielded a fund of information on which we can still draw. The more recent cases of Laura Bridgman and Helen Keller are also of sufficient interest to merit a short description.

Laura Bridgman was born in 1829, and lived until 1889. Losing the senses of sight and hearing, and having those of taste and smell much impaired, as the result of scarlet fever when she was only two years old, she was dependent almost entirely on her sense of touch to enable her to learn something of her environment. Under the tuition of Dr. Howe of Boston she came, in

the course of years, to associate a particular object with its name, as rendered in embossed or Braille type, and in this way she acquired a vocabulary which her native intelligence enabled her to turn to such account that, in turn, she became a teacher of sufferers from defects like her own.

Helen Keller, who became blind and deaf at the age of nineteen months, was from the age of seven years trained on somewhat similar lines to those just mentioned. As a means of expression she was able to use a typewriter. Like Laura Bridgman, she made great progress and, it is stated, she acquired a competent knowledge not only of English, but also of Latin, French, and German. She eventually took the Degree of Bachelor of Arts and wrote several books.

School training should be continuous with that in the home or ward, since one of its aims is to fill out the knowledge of names and uses already acquired, with such additional particulars of objects seen and handled as will give a more complete mental picture of them. Thus, articles in general use are displayed on the schoolroom walls to supply texts for lessons on their materials or mode of manufacture, or the spelling of their names.

Whether by accident or design, the systems of teaching the mentally defective now adopted show a recognition of the importance of adapting tuition to capacity. The kindergarten methods, the methods of Dr. Maria Montessori, of Miss Macdowall and others, all keep that end in view. They all employ special appliances designed to appeal to the senses of sight, touch, hearing, etc. The articles employed and the conditions under which they are used vary; but perhaps the main distinction is that under the Montessori system special stress is laid on letting the child himself indicate what he wants to learn, while under the others there is more continuous guidance, which may or may not be helpful, according to the amount of knowledge of the child's mind which the teacher possesses.

Some degree of familiarity with the different types of apparatus used and with the way of using them is desirable on the part of the nurse.

(*a*) *The Kindergarten System.*—With this the name of Froebel, its founder, is associated. The articles used are:

(i.) A set of six coloured wool balls, with strings by means of which they can be suspended from a simple frame.

(ii.) A sphere, cylinder, and cube all made of wood and capable of being hung up.

(iii.) A 4-inch cube divided into eight smaller cubes.

(iv.) A 4-inch cube divided into eight oblong blocks.

(v.) A 3-inch cube divided into twenty-seven cubes, some of which are subdivided.

(vi.) A 3-inch cube divided into twenty-seven oblongs.

(vii.) Painted wood tablets of square and trianguiar shape.

(viii.) Straight and jointed laths.

(ix.) Short sticks, like rounded matches, 1 inch and 2 inches in length.

(x.) Wire rings and half rings of various sizes.

(xi.) Lengths of thick coloured thread, beads, cards for perforating on which designs are subsequently worked in coloured wool; papers ruled in squares for teaching drawing.

(xii.) Materials for paper plaiting; mat-weaving; paper folding and cutting; modelling in clay, plasticine, and sand; basket-making, sewing, and knitting.

Lessons in form and colour are given by using the various articles as blocks for building, or as the elements of designs of all kinds. Accuracy is attained in the movements involved, and this is turned to account in the manual exercises which lay the foundation for learning practical industries. Other developments are in the directions of reading, writing, numbering, singing, and drill.

(*b*) *The Montessori System.*—This requires the use of:

(i.) Wooden blocks, each bored to receive ten cylinders which differ in diameter, in height, or in both these respects.

(ii.) Ten wooden cubes steadily diminishing in size.

(iii.) Ten wooden prisms all of the same length, but graduated in size as regards the sectional area; these constitute "the broad stair."

(iv.) Ten square rods of the same sectional area, but graduated as to length; these constitute "the long stair."

(v.) A board with half of its surface rough and half smooth.

(vi.) A board bearing strips of paper of different degrees of roughness.

(vii.) Samples of coloured stuffs.

(viii.) Wooden tablets of the same size, but differing in weight and colour.

(ix.) Spools covered with bright silk of various colours.

(x.) Sets of geometrical figures, circles, rectangles, triangles, polygons, etc., which can be inserted in suitable frames.

(xi.) Sets of cards bearing geometrical designs similar to the insets mentioned under (x.).

(xii.) Six closed cardboard cylinders containing different materials, so that when shaken they produce sounds of different intensities.

These are the materials used for the education of the senses. Special devices are used for teaching music, writing, reading, arithmetic, and drawing. Motor training is left largely to the circumstances of everyday life, but frames bearing pieces of cloth or leather, which can be fastened together by hooks or buttons or laces, are used for supplying instruction in the arts of dressing and undressing.

(*c*) *The Macdowall System.*—In the way of special appliances we have:

(i.) A stand with rings, which can be placed over the upright peg.

(ii.) A square board supported on short legs and perforated with twelve holes. With this are used balls of two sizes, such that those of one size will rest in the holes, while the smaller ones will drop through. The board is conveniently placed in a shallow tray to facilitate securing the balls which drop through.

(iii.) Round and flat wooden needles for threading and weaving.

(iv.) Small square wooden tablets, each with a central hole, for threading on a string.

(v.) Boards perforated with thirty small holes, with which and the round needle a simple sewing stitch is taught.

The Montessori apparatus is also used together with more familiar articles, such as beads of every colour and size, cardboard rings for ball-making, slate frames (without the slates) for stretching canvas or doing simple weaving, coloured bags of different sizes and weights, pictures and toys.

In addition to the various articles mentioned above, the nurse will find, at particular institutions, devices worked out locally or gleaned from systems other than those referred to. Such things include what are called "bean-bags"—*i.e.*, small bags made of brightly coloured flannel and loosely filled with beans or maize, which can safely be used as missiles by or against a child, and so encourage him to use his hand and arm muscles; the "peg-board," for checking that irregular movement called athetosis;

the " mystery bag," in which the child fumbles in the endeavour to recognise articles by their form alone; " domino-boards "; special painted wooden bricks of large size for building operations on the grand scale; and models of various kinds.

For children who are capable of learning the subjects taught in ordinary schools, the methods employed in the best of those schools are suitable. Although a certain amount of teaching may fall to the lot of the nurse, it will probably be performed under the supervision of trained teachers, who will lay down the methods to be employed. It is, however, just as well to know that different methods are used by different persons. In the case of reading, for instance, the plan of starting by learning the alphabet is going out of fashion. Some part of its lack of success is perhaps due to the way in which the alphabet is often taught as though the mere acquisition of it were the sole end in view. Having learned to recite it as a whole in a sing-song way, the child has no clear idea of the component letters. If asked, " What comes after k ?" or " What is the last letter ?" he has to run through the letters from the beginning until he reached the desired fact. As a means of building words the letters are of as much use to him as his box of bricks would be for other building operations if he had got the bricks all stuck together with glue. Then there is the " look and say " method, in which printed words are associated with the things for which they stand, and learned as the names of those things. In most general use now is the " phonic " method, which builds up words from their component sounds. The " look and say " method is, perhaps, best for children of the " visual " type—*i.e.*, children whose chief channel for the reception of impressions is the organ of vision, while the " phonic " method is more suitable for those who rely on hearing rather than sight. A combination of all three methods probably gives the most satisfactory results.

In learning to write, the development of capacity takes place through the gradual substitution of fine movements for coarse ones. The child first makes his letters on the blackboard with free-arm movements, and by degrees reduces the scale of his operations to the field of a slate or a sheet of paper.

As regards arithmetic, it does not appear that the ingenuity expended in searching for labour-saving devices has had much reward. The tables containing the results of adding or multiplying together the units must be committed to memory, and

though the ways of doing this vary in difficulty, none of them is easy for the average mentally defective person, though sometimes one meets with patients with a special facility in arithmetic. It does not even appear that any particular way is the best for all children. For the same reason, as in the case of the alphabet, the practice of singing the tables is open to objection. Aptitude for drawing or for music sometimes characterises the mentally defective, and they may, for example, become competent performers in a band. Such special qualifications are prominent because they stand out against the general background of inefficiency. The notion of "*idiots savants*"—*i.e.*, of idiots whose accomplishments in some particular art amount to a display of genius—seems to have no very sound basis. Its prevalence is to be attributed to the common human weakness for making miracles out of the misunderstood.

The diversity of practice hitherto found in different institutions will become less marked when certain suggestions made by the Board of Control are more widely adopted. As regards general principles, the Board makes the following recommendations, viz.:

(1) Children up to the age of sixteen should be regarded as of school age. No patient over sixteen should be allowed to remain in school except for special reasons and by order of the Superintendent.

(2) The morning school session should be of two and a half hours' duration, and the afternoon session two hours, both to include a short break.

(3) As a rule there is no need to separate the sexes during school.

(4) Except where trade instruction is concerned, it will be found better to employ women in teaching both sexes of the mentally defective.

(5) Classification of school-children should be regulated by mental and manual capacity without regard to age. It is an advantage to have a separate classification for manual work, because a child, although properly placed in a low class for mental work, may be quite capable of receiving advanced manual or trade instruction.

(6) At least half the total number of school hours should be given to manual work.

(7) Unless exempted by the Medical Officer, every child should be given physical drill daily.

(8) A time-table and a syllabus of work for each class should be drawn up and be available for inspection at all times.

(9) Progress books should be kept for all children, and notes entered at least once every six months.

The equipment suggested is on the lines laid down by Miss Macdowall, and the scheme of classification of the children is thus outlined:

(i.) *The Lower School,* comprising:

(*a*) The Nursery Class.
(*b*) The Preparatory Class.

(ii.) *The Upper School,* comprising:

(*a*) The Testing Classes.
(*b*) The 3-R's Division.
(*c*) The Oral Division.

(iii.) *Trade Preparatory Classes.*

In the application of this scheme, a child who appears capable of learning the rudiments of reading and arithmetic starts in the testing classes. If he is of lower grade he goes into the lower school, whence he may move up eventually into the testing classes, if he develops to the extent of becoming likely to learn to read and do sums. Failing this, at about the age of twelve, he is trained in house or industrial work, as it is recognised that ordinary school subjects are beyond his powers. Children in the testing classes pass on into one or other of the divisions marked (*b*) and (*c*), according to the progress they make in reading. Any child who, at the age of about eleven, is unable to read a Standard I. book, proceeds to the "oral" side; one who can satisfy this test to the "3-R's" side. Substantially, the difference between these lines of education is that along (*b*) the child proceeds by the usual school route to acquire knowledge largely from books. He learns to read, write, and do arithmetic, these being the subjects which teachers, by a curious concession to illiteracy, call the "3 R's." Along line (*c*) the information to be picked up by the child is furnished chiefly by word of mouth with blackboard illustrations. In the ordinary course, the "3-R's" child would continue in the division until he reaches the age of sixteen, but if he ceases to make headway with the "R's," he may confine himself to physical and manual training, or be transferred to the oral division.

In the lower school, training of the sense organs and those of speech, together with exercise of the muscles in drill and simple

manual occupations, is undertaken. A large proportion of the time spent in the upper school is similarly occupied, though as the child becomes more advanced the manual work should more and more take a form which will serve as preparation for particular industries. Something will, naturally, depend on the circumstances in which he will ultimately be living, but where institution care is to be maintained, the training will be such as to fit him for one of the industries carried on in the institution workshop. The trade preparatory classes have this sort of training as their special aim, and the course of study pursued in them may well include visits to the workshops. Tools and materials used in the industries are exhibited and demonstrated, and the first steps in woodwork, upholstery, tailoring, etc., are practised. The appropriate age having been reached, and the necessary facility attained, the child concentrates on the new aspect which is dealt with in the next paragraph.

3. **In the Workshops.**—There is said to have been once a great mathematician who proudly claimed for a discovery he had made that it could not be degraded by being put to any useful purpose whatever. The teaching of manual work to the mentally defective has often seemed to be based on similar conceptions, and they have been encouraged to attempt, without hope of success, things beyond their powers, rather than to do simple things well. It is in the best interests both of the mentally defective and of the community at large that in organising occupations for the former, attention should be paid to the possibility of reducing the burden on the latter. Of course, in cases where the defective has ample means, the selection of an occupation may be dictated by considerations of elegance rather than of utility.

If instructed in the art of making the familiar things which they see about them, the mentally defective can understand the end which their training has in view; and to be able to see the fruits of their labours turned to account is a strong incentive to cheerful industry. What to the ordinary person may appear a dull and trivial task will furnish an absorbing interest to the mentally defective, and he will, with a minimum of encouragement and without expectation of material reward, devote himself to it with an enthusiasm which will make overtime a pleasure. But though, on the one hand, the work can supply its own reward, on the other, anything like compulsion is hopeless. It is necessary, therefore, to find out by experiment what a patient can

do; and he may have to be tried at many industries before he finds one to suit him. Temperament, physique, age, and sex, naturally count for something; a quiet and weakly boy may like the tailors' shop, while an active and robust one will prefer to wield a hammer or wrestle with a big basket; girls will have duties in laundry and needle-room, which boys are not well adapted for. Even when a boy is suitably placed his limitations must be borne in mind; he must begin at the beginning and stop when he has reached his level. Like students in other training institutions, the mentally defective learn much from watching and talking with one another, and no false conception of discipline should be allowed to interfere with this important factor in learning. Mistakes made by patients should be opportunities for friendly counsel, not occasions for criticism; if not dealt with in this way they will be concealed, and perhaps cause annoying waste of time and material. This possibility of waste is very important where a shop is trying to pay its way, and at an early period of training the need for care must be impressed upon the worker. To this end, also, the teacher must keep a careful account of the material supplied to him. Similarly, a patient will take more care of the tools he uses if he has learned to sharpen them himself. If a new industry is being undertaken, it will add greatly to the interest shown in it by the workers if they are allowed to help in fitting up and getting ready the place where it is to be carried on. Since few of the patients will attempt anything new, the instructor must be prepared to supply the necessary lead when any fresh development is contemplated.

From what has just been said, and from the experience of those who have had to administer workshops for the mentally defective, the following principles emerge:

(*a*) Let the patient begin early—*i.e.*, let such manual work as he does in school be the first step in education for some definite industry.

(*b*) Have as many industries as possible. In practice only a large institution can afford to have a great variety of trades taught economically.

(*c*) As far as possible use what in ordinary trading is waste material. As this is cheap, there is no great loss caused if a patient's efforts to utilise it do not succeed; and if it is successfully turned to account the profit it yields is proportionately high. Many of the best workers, however, will learn to turn out

goods up to the ordinary market standards from the ordinary raw materials purchased in the market. The execution of repairs also provides a field in which the mentally defective meet with success.

(*d*) The various shops should play into the hands of each other; thus the carpenter and the basket-maker should make chairs for the upholsterer to complete; the bookbinding shop can make cardboard boxes for the packing or storage of articles made elsewhere, and so on. It may happen, too, that what in one shop would be waste can be utilised in another.

(*e*) Do not lay stress on the possible risks attending the presence of ordinary tools, but at the same time keep a sharp watch for any improper use of these. Unless the fact that hammers, chisels, soldering irons, etc., can be employed as dangerous weapons is suggested to a patient, he will be quite content to use them in a legitimate way. Some additional risk is involved by the installation of power-driven machinery, but if the machines are adequately protected their advantages more than compensate for the responsibility of supervising them.

(*f*) Since there is unskilled labour available, it may pay to use it for work which in an ordinary workshop would not be attempted—*e.g.*, in digging out the stumps of bristles from old brushes so that the stocks may be used again.

(*g*) It is their capacity for imitation which supplies the main avenue of progress in the care of the mentally defective. Let them, therefore, have good copies to work from.

(*h*) Exercise discretion in the granting of rewards. Let the satisfaction of doing a job well suffice. If rewards are given, let it be on a basis of the patients' attempts rather than of the results they have obtained. The patients' estimate of the value of a piece of work may be quite different from that of the instructor. Judicious competition is, however, just as helpful to the mentally defective worker as to the normal one.

The industries which are most suitable for introduction into an institution for mentally defective persons are:

1. **Toy-Making.**—Given an instructor possessed of a little ingenuity, a great variety of interesting little tasks can be made available, while almost anything in the way of "rubbish," as ordinarily understood, can be utilised. As so many toys are made of wood, the shop gives opportunities of working which lead on to the more exacting requirements of carpentry.

2. **Carpentry.**—Quite high-grade work is often done in a carpenters' shop: roof trusses and doors, window-sashes and furniture of all kinds can be made, and there will be a constant stream of damaged articles from the wards and elsewhere for repair.

As side branches turning and wood-carving can be taken up.

3. **Brush-Making.**—Both brushes which have the bristles fastened in with wire and those with the bristles set in pitch can be made. The finishing processes involve various stages of different degrees of difficulty, which give opportunities to various grades of patients. The need for avoiding waste is especially marked in connection with this industry, owing to the cost of the material employed.

4. **Shoe-Making.**—Very necessary work is done in the shoe-making shop, but it does not present any special features. No very expensive equipment is required for ordinary repairs, but if new boots and shoes are to be made satisfactorily, more elaborate machinery will be needed.

5. **Basket-Making.**—Osier baskets are the main stay of this industry, but cane and rush are also employed. The reseating of cane-bottom chairs is a side branch of the industry.

6. **Mat and Rug Making.**—Wool and fibre are used alone or in combination; and with the help of frames and looms a considerable variety of patterns can be produced. For wool rugs a special canvas base is required. Rope-work and sack-making can be carried on in conjunction with the other branches.

7. **Bookbinding.**—With this can be combined envelope, paper-bag, and cardboard-box making. The higher branches include lettering and page numbering.

8. **Tailoring.**—Like shoe-making, this is an industry of much utility from the institution standpoint, but not one calling for any particular description.

9. **Upholstering.**—The two chief branches here are the making or remaking of mattresses and pillows and the upholstering of articles of furniture. The first-mentioned branch calls for the use of hair-carding machinery, which must be power-driven to be effective.

10. **Printing.**—Here also power-driven machinery is essential if work on a scale large enough to be profitable is to be undertaken. A stereotyping plant is also desirable.

11. **Building.**—The large amount of cleaning, painting, and general repairing work which is called for in an institution will provide a means of occupation for many patients, and by its diversity afford scope for all degrees of skill.

12. **Farming and Gardening.**—Though these have no special relation with shops, they must be noted as forms of industry at once profitable to the institution and helpful to the patient.

13. **Wood-Chopping.**—This is an industry which calls for no great skill. Perhaps its most interesting aspect is found in the fact that imbeciles can chop, with a heavy knife in close proximity to the fingers holding the wood, for months or years without injuring themselves.

The occupations so far mentioned are chiefly suitable for boys, though girls can do brush, rug, and mattress making. For them, however, the institution needle-room, laundry, and kitchen will supply the chief facilities required. Associated with needlework, in doing which many patients can be safely trusted with sewing machines, are weaving and knitting, by means of complicated machines, stockings and jerseys.

As regards working hours, it is found that from 8.30 or 9 a.m. to 5 p.m., with a break of an hour for dinner and a short interval in the middle of the morning and of the afternoon, is easily within the powers of the ordinary defective. Under modern conditions of labour it will probably not be found convenient to have the shops open more than five days a week.

INDEX

The more important references will be found in thick type. The abbreviation G.P.I. is for General Paralysis of the Insane.

Abbreviations test, 556
Abdomen, 50, **52**
  landmarks, 62
  surface-marking, 52
  to prepare for examination, 57
Abdominal aorta, 59, 62
  diseases, acute, 256
  enlargement, 535
  reflex, 387, 388
  ring, external, 52
" Abducted attitude," 395
Abduction, 49
Abductor muscles, 37
Aberrations, temporary, 558
Abnormal psychology, 529
Acceleration, 406
Accident case, preparation for, 84
  reporting, 83
Accommodation (eye), 316
Acetabulum, 44, 47
Acetylene, 125
Acid, boracic (boric), 88, 111, 118, 198, **199**
  carbolic, 87, 123, **193**, 196
  hydrochloric (muriatic), 71, 119, 123
  hydrocyanic, 124
  nitric, 119, 123
  oxalic, 123
  picric, 118, **194**, 197
  prussic, 124
  sulphuric, 119, 123
  uric, **77**, 256
Acidity of urine, 188
Acme (fever), 226
Acne, 233
Acquisition, instinct of, 343
Acromegaly, 82, 537
Action, reflex, **323**, 328, 386
Actions, automatic, 428
Acute delirious mania, 453
  delirium, 453
  mania, 442
  melancholia, 438
Adaptability and evolution, 332
Adaptation test, Goddard's, 555
Addison's disease, 81
" Adducted attitude," 395
Adduction, 49
Adductor muscles, 37
Adenoids, school children, 562
Adenoma sebaceum, **522**, 539
Administration of medicines, 167
Admiration, emotion of, 344
Adolescence, 372
Adrenal glands, 50, **81**, 313, 375
  and emotions, 493
Adrenalin, **81**, 109
Affect (feeling), 332, **338**
Affective loss, 418
  suggestibility, 347
Afferent fibres, 294
" After-birth," 79
Age, influence of, 372
" Age, intelligence," 553
" Aggression attitude," 395
Agnosia, 528
Agrammatism, 527
Aid, First, 83
Air beds, 174
  composition of, 67
  borne organisms, 264
  expired, 67
  passages, foreign body in, 125
  pure, 143
  vesicles, 64
Albumin, egg, 150
  in urine, 189
  serum, **54**, 150
  water, 165
Albumoses, 150
Alcohol, 119, 155
  and mental deficiency, 563
  and polyneuritis, 473
  group of antiseptics, **195**, 198
  mental disorders due to, 473
Alcoholic delirium, 474
  insanity, chronic, 475
  mania, transient, 474
Alcoholics and projection, 365
Alcoholism, 373
  chronic, 475
Alienation, 400
Alienists, 400
Alimentary canal, 67

Alimentary system, 31, **87**
what to observe, 182
Alkali burns, 119
Alkalies, strong, 123
Alternating states, 445
Altruism, 13
Amaurotic family idiocy, 541
Ambidexterity, 526
Amenorrhœa, 259
Amentia, 519
American researches: feeble-minded, 560
Ammonia, 67, 119, 123
Ammoniated mercury, 193
Amnesia, **408,** 434
Amœba, **29,** 78, 283
examination of, 332
Amusement, 501
Amylase, 72
Anæmia, 228
Anæsthesia, **381,** 540
complications, 221
crossed, 382
Anæsthetic, local, 381
general, 381
Anal reflex, 387
spasm, 386
Analysis, psycho-, 366
psychological, 355, **515**
Anatomical classification, mental defectives, 533
stigmata, 520
Anatomy, 28
surface, 51
Ancestral mind, 336
inheritance of, 333
Anencephaly, 521
Anergic stupor, 457
Aneurism, 237
Anger, emotion of, **342,** 344
Angina, 242
Animal experiments, 324
Ankle clonus, 389
jerk, 389
joint, fractures about, 131
reflex, 387
Anode, 384
Ante-natal causes, mental deficiency, 561
Anterior crural nerve, 309
white columns of cord, 305
Antidotes, 122
Antisepsis, 86, **191**
principles, 199
Antiseptics, 86
alcohol group of, 195, 198
chlorine group of, 194, 197
iodine group of, 194, 197
oxygen group of, 194, 197
Antitoxin, diphtheria, 280
Antitoxins, 265
Ants, communal life of, 287
Anus, 67, 68, 74
Anxiety, morbid, 418
neurosis, 391, 432
Aorta, 50
abdominal, 59, 62
Aortic valve, 59
Aperients, 168
Aphasia, 322, 327, **528**
Aphonia, 527
Apoplectic stroke, 481
Apoplexy, 116, 117, 237, 295, **481**
Appearance, general, of patient, 178
Appendicitis, 75, **256**
Appendix, vermiform, 53, **74**
Appetite, disturbance of, 227
observation of, 182
Applications, local, 201
Apprehension, morbid, 418
Approved homes (mental deficiency), 567
Aptitude, natural, 327
Arch, palmar, 62
plantar, 62
Arc, reflex, 323
Area, arm, 297
audito-psychic, 322
face, 297
leg, 297
visuo-sensory, 317
writing, 297
Argyrol, 193, 196
Arithmetic, teaching of, 578
Arm area, 297
Arm-sling, fractured clavicle, 90
large, 89
Arrowroot, 165
Arsenic, 123, 124, 374
Arterial blood, 61
hæmorrhage, 105
Arteries, 58
atheromatous, 258
disease of, 236
iliac, 59, 62
of brain, 295
Arterio-sclerosis, **237,** 258, 373
Artery, anterior tibial, 62
axillary, 62,
brachial, 62
carotid, 62
femoral, 62
hepatic, 63
palmar arch, 62
plantar arch, 62
popliteal, 62
posterior tibial, 62
pulmonary, 60
radial, 62
subclavian, 62
ulnar, 62

Artery, vertebral, 295
Articular cartilage, 48
Articulations, 48
Artificial feeding, 163
respiration, 112
teeth, 496
Ascites, 263
Asepsis, 86, 191
Assimilation, 70, 75
Association cells, 294
free, 353
directed, 353
layer, 300
of ideas, 352
Asthma, 244, **246**
Asylum, meaning of, 1
" Asylums," 566
Asymmetry, 522
Atavism, 369
Ataxia, 382
cerebellar, 382
locomotor, 268, **483**
Atheroma, 237
Athetosis, 385, 540, 577
Atlas, vertebra, 43
Atmosphere, impurities of, 67
Atrophy, postures from, 394
Atropine, 125
Attention, **351**, 407
Attitude, " abducted," 395
" adducted," 395
" aggression," 395
" burial," 395
" crucifixion," 395
" fighting," 395
" interosseous," 394
of patient, 178
scientific, 330
" shoemaker," 363
Attitudes associated with mental disease, 395
Audito-psychic area, 322
Auditory canal, 319
hallucinations, **404**, 436, 443
images, 352
nerve, 308, **320**
Aura (epilepsy), 428
Auricles of heart, 56
Auto-intoxication, 374
Automatic actions, 428
Automatic *v.* voluntary movements, 326
Autonomic centres, 311
nervous system, **311**, 312
Aveyron, wild boy of, 533, 574
Awe, compound emotion of, 345
Axilla, temperature of, 179
Axillary artery, 62
Axis, vertebra, 43
Axon, 291, **293**
myelinated, 293
Babinski's sign, **388**, 492
Bacilli, 86, 264
Bacillus, diphtheria, 264
tubercle, 264
typhoid, 264
Bacteria, 86, **263**
location of, 265
mode of entry, 265
" Bad habits," 525
children, 573
Bags, ice, 204
Ball-and-socket joints, 48
Balsam, Friar's, 109
Bandage, broad, 89
capeline, 99, 101
closed fist, 93
convergent, 96
divergent, 96
eye, 102
figure-of-eight, 95
finger, 98
four-tailed, 102
hand, 92
head, 90
hip, 91
knotted, 101
many-tailed, 102
perineum, 105
recurrent, 95, 100
reverse, 95
reversed spiral, 96
roller, 94
spica, 96
spiral, 95
stump, 98, 99
T-shaped, 102
tailed, 102
thumb, 98
triangular, 88
Bandaging, 88
Barley water, 166
Basal ganglia, 289, **301**, 335
Basket-making, 584
Bath, blanket, 175
cold pack, 212
evaporating pack, 213
hot-air, 214
hot pack, 213
prolonged, **212**, 443, 450
medicated, 214
needle, 213
shower, 213
sitz, 213
special, 212
sponging, 213
temperature of, 497
wet pack, 212
Bathing, 145, 497
" Bean-bags," 577
Bed, air, 174
preparing for accident case, 85

Bed rests, 174
sores, 175
causes of, 176
in G.P.I., 490
water, 173
wetting, 422
Beds, 171
fracture, 173
Bedsteads, 171
Beef-tea, 165
Bees, communal life of, 287
Beggars, 545
Behaviour, 349
Belladonna, 125
Betz cells, 300
Bicarbonate of soda, 118, 119
Biceps muscle, 36
Bile, 68
duct, 68
in urine, **189**, 257
Binet-Simon scale, 548
Biniodide of mercury, 193, 196, **200**
Binocular vision, 317
" Bipp," 194
" Birth-marks," 522
Bites, cat, 119
dog, 119
snake, 119
Bladder, 50, 53, 77
attention to, 20
Blanket bath, 175
Bleeding, 105
Blind spot (eye), 316
Blister plaster, 204
fluid, 204
Blisters, 118, 204
Blood, 53
arterial, 61
cells, 53
clot, 54
corpuscles, 53, 63
in stools, 183
in urine, 189
in vomit, 183
transfusion, 110, 210
venous, 61
Bloodvessels, 54, **58**
important, position of, 62
Bodily health, management of, 499
Body and mind, interaction of, 390
cavities, 50
growth of, 534
materials, chemical nature of, 31
structure of, 28
temperature, 133, **179**
Boils, **234**, 259
restraint for, 453
Bolus, 70
Bones, carpal, 46
clavicle, 46
disease of, 236
ethmoid, 40
femur, 47
fibula, 47
fragility of, in G.P.I., 490
frontal, 40
functions of, 38, 39
hand, 46
humerus, 46
ilium, 44
innominate, 44
ischium, 44
mandible, 40
maxilla, inferior, 40
superior, 40
metacarpal, 46
metatarsal, 47
nasal, 40
occipital, 40
ossification of, 40
parietal, 40
patella, 47
phalanges, 47
pubic, 44
radius, 46
scapula, 46
sphenoid, 40
tarsal, 47
temporal, 40
tibia, 47
ulna, 46
Bone-tendon reflexes, 387
Bookbinding, 584
Boracic (boric) acid, 88, 111, 118, 198, 199
gauze, 201
Borderland cases, 400
Boro-glycerine, 118
Bottles, hot-water, 86, 173
Bounding pulse, 181
Bourdon's test, 555
Bovril, 165
" Box-bed," 143
Box-shaped head, 537
Brachial artery, 62
plexus, 309
Brachycephalic head, 523
Brain, arteries of, 295
compression of, 116
concussion of, 115
fissures of, 296
injury to, 115, 373
lobes of, 296
human embryo, 288
in idiots, 301
organ of mind, 5
the, 295
seat of consciousness, 334
of mind, 334

Brain, " water on the," 530
Breathing, character of, 184
Breath, observation of, 182
odour of, 251
shortness of, 241
Bridge, faulty (metaphor), 370
Bridgman, Laura, 533, **574**
Bright's disease, 240, **256**
Bromides, 452
Bronchi, 50
left, 64
right, 64
Bronchioles, 64
Bronchitis, acute, 245
chronic, 246
Broncho-pneumonia, 246
Brush-making, 584
Bugs, 141
Building, 585
Bulb, olfactory, 313
" Burial attitude," 395
Burns, 118
by chemicals, 119
by alkalies, 119
Burt, intelligence tests, 554
Butter, 154
" Butterfly rash," 522

Cachets, 168
Cæcum, 53, 74
Calcined magnesia, 122
Calcium, 32
Callus, 127
Caloric values, 152
Calories, 152
Calves' foot jelly, 166
Canal, auditory, 319
spinal, **42,** 304
Canals, semicircular, 319
Cancellation tests, 555
Cancellous tissue, 39
Cancer, 260
of stomach, 251
Canine teeth, 41
Capeline bandage, 99, 101
Capillaries, 58
hæmorrhage from, 107
in skin, 32
Capsule, internal, 302
Carbohydrates, 69, 151
Carbolic acid, 87, 123, **193**, 196, 200
Carbon, 32
dioxide, 67
monoxide, 125
Carbonic acid gas, 67
Carbuncle, **235,** 259
Cardiac plexus, 312
Care of the dead, 222
Carnal knowledge of patients, 25
Carotid arteries, **62,** 295
hæmorrhage, 109
Carpal bones, 46
Carpentry, 584
Carpet, cleaning, 140
Carriers, disease, 264
Carrying injured, 83
Cartilage, articular, 48
costal, 43
fibro-, **39,** 40
hyaline, 40
Casein, 69, 150
Case, new, reception of, 160
observation of, 177
taking, 499
Catalepsy, 396, **525**
Cataract (eye), 316, 524, 535
Cat, bite of, 118
" Catching cold," 134
Catheter, cleaning, 209
female, 208
fever, 210
lotion for, 199
male, 209
sterilising, 210
Cauda equina, 309
Causes of nervous and mental disease, 368
of mental deficiency, 558
" Caustic," 193
potash, 119, 123
soda, 119, 123
Cavity, glenoid, 46
Cell elements, 291
motor, 284
nerve, 284, **291**
nucleus of, **30**, 291
sensory, 284
tissue, 29
wandering, 284
Cells, Betz, 300
connector, 294
Cellulose, 153
Censor, 377
Centres, autonomic, 311
hearing, 298
sense impressions, 297
sight, 298
smell, 298
speech, 297
sympathetic, 312
taste, 298
Cephalic index, 523
Cerebellar ataxia, 382
Cerebellum, 289, 291, **303**
peduncles of, 303
Cerebral cortex, 289
functions of, 328
minute structure of, 299
hæmorrhage, 113, 295, 373
hemispheres, 289
tumours, 492
vesicles, 288

Cerebro-spinal fluid, 295
meningitis, 481
nervous system, 295
evolution of, 286
Cerebrum, 296
crura of the, 302
Certified houses, 567
institutions, 567
Cervical nerves, 309
plexus, 309
vertebræ, 42
Cervix uteri, 78
Changing sheets, 172
Character, 348
Characters, unit, 369
Charcoal, wood, 122
Charcot's joints, 483
Charge nurse, 157
Charts, keeping of, 190
Cheerfulness, 11
Cheese, 154
Chemical restraint, 452
Chemicals, burning by, 119
Chemistry, 31
Chest, to prepare for examination, 158
Cheyne-Stokes respiration, 185
Chilblains, 525, 535
Child, development of mental faculties, 547
dull or backward, 545
Childish tendencies, 355
Children, behaviour of, 360
general paralysis in, 541
Chloral, 452
Chlorine, 125
group of antiseptics, **194,** 197
water, **194,** 197
" Chloros," 194
Choking, 121
risks of, 24
Chorea, 261, 385, **427**
Huntington's, 427
Choroid bodies, 296
Chronic mania, 443
Chyle, 64, **74**
Chyme, 72
Circle of Willis, 295
Circular insanity, 445
Circulation, diagram of, 59
portal, 63
pulmonary, **56,** 61
systemic, **56,** 61
Circulatory disorders, 398
system, 31, **54**
diseases of, 236
Circumduction, 49
Classification, mental defectives, anatomical, 533
Dr. Ireland's, 530
Clavicle, 46
Clavicle, fracture of, 129
arm-sling for, 90
" Claw fingers," 394
Cleaning a ward, 158
Cleanliness, 15
Cleansing, 140
sick, 174
Climacteric, 259, **372,** 558
Climbing posture, 395
Clonic spasm, 116, **385,** 428
Clonus, ankle, 389
Clothing, 147
inventory of, 495
patient's, removal of, 84
Clouston, Sir Thomas, definition of delusion, 410
Clove-hitch, 108
Coal-tar preparations, 193, 196
Cocaine, 374
mental disease due to, 476
when illegal, 26
Cocci, 86
Coccygeal nerve, 309
Coccyx, 42, **43**
Cochlea, 319
Cocoa, 155
Cod-liver oil, 153
by inunction, 171
Coffee, 155
milk, 165
" Coffee-grounds vomit," **183,** 251
Confusion, states of, 455
Cognition (knowing), **332,** 338
Cognitive suggestibility, 347
Cold, effects of, 117
Cold pack (bath), 212
sensations of, 305
Colic, 73
intestinal, 252
Collapse, 115, **230**
from drink, 116
Collecting rubbish, 421
specimens of urine, 187
Colles's fracture, 129
Colliculi, 289, 291, 302, 317, 320 321
Coloboma, 524
Colon, 53, 74
Coma, 231
diabetic, 260
vigil, 231
Comminuted fracture, 127
Commissure, optic, 317
Common sensations, 349
Communal life: ants, bees, 287
Comparison (psychology), 33
Complex, 377
emotional states, 344
Complexes, repressed, 377
Complexion, changes in, 244
Complicated fracture, 127

Compound fracture, 126
Compresses, 203
Compression, brain, 116
Conation (striving), 332, 339
Conative suggestibility, 347
Concealment, instinctive, 341
Concussion, brain, 115
Conduct, 349
  responsibility for, 6
Confidential nature of nurse's work, 90
Conflicts, 356, 377
Confusion, 407
Conjunctiva, 318
Connector cells, 294
Consanguinity of parents, 560
Conscious control, 377
Consciousness, brain the seat of, 334
  study of, 349
  what is ? 331
Consecutive thought, disorders of, 406
Consonants, 321
Constipated stools, 184
Constipation, 20, 252
Construction, instinct of, 343
Consumption, 248, 266
Contractures, 235
Convergent bandage, 96
Conversion, 364
Convolutions (brain), 296
Convulsant poisons, 123, 124
Convulsions, 116, **386**, 525
  in nephritis, 258
Cookery, sick-room, 164
Coprolalia, 528
Cord, spinal, 304
  level, 324
Cornea, 315
  opacity of, 524
  reflex, 387, 388
Corona radiata, 301
Corpus callosum, **296**, 298, 326
Corpuscles of blood, 53
  white, 54, 63
Corrosive poisons, 123
  sublimate, 123
Cortex, cerebral, 289
  functions of, 328
Costal cartilages, 43
Cotton: clothing, 147
Cough, 185, 242, 243
  suppressed, 243
Counting patients, **17**, 120
Counter-extension, 216
Country walks, 502
Cousins, marriage of, 370
Cowpox, 279
Cow's milk, 154
Cradles, 174
Cranial dimensions, 536
  nerves, 307
Cranium, 40
  abnormalities, 522
Cranks, 400
Cream, 154
Cremasteric reflex, 387
Crepitus, 130
" Cresol," 194, 197
Cretinism, 81, 273, **538**
  and thyroid, 493
Cretinoid type, 532, 538
Cricket, illustration from, 327
" Crises " in locomotor ataxia 482
Crisis, 226, 247, 274
Crossed pyramidal tracts, 304
Cross-questioning, 401
" Crucifixion " attitude, 395
Crural nerve, anterior, 309
Crura of the cerebrum, 302
Cry, epileptic, 429
Cube test, 556
Cupboard, poison, 157
Curative treatment, 2, 513
Curiosity, instinct of, 342
Cuticle, 32
Cut throat, 121
Cyanide gauze, 201
Cyanosis, 241
" Cyllin," 194
Cynicism, 363

Day-dreaming, 361
Day-room, 135
Dead, care of the, 222
Death, personal effects, 223
  " rattle," 222
  signs of, 223
    approaching, 222
  sudden, 223
Decline (fever), 226
Decussation, 304
Deep reflexes, 387
Defective persons, classification, 530
Defects of hearing, 562
  of vision, 562
Deficiency, mental, 518
Definition, insanity (Maudsley's), 400
  mental deficiency, legal, 542
  practical, 543
Deformities of the joints, 235
Degeneration, fatty, 240
  stigmata of, 398
Degraded habits, 422
Delirium, 247, 391, 407
  acute, 453
  alcoholic, 474

Delirium, states of, 453
tremens, 452, **474**
Deltoid muscle, 49
Delusion, 359, 459
chronic states of, 462
definition, Clouston's, 410
fixed, 411
fleeting, 411
states of, 459
Delusional insanity, 459
states, progressive, 460
Delusions, 409
grandiose, 362
non-systematised, 411
of persecution, 412
of special importance, 412
of suspicion, 412
systematised, 411, 461
Dementia, 463
advanced, 396
brain in, 301
organic, 465, **482**
paralytica, 268
præcox, 375, 379, 418, **465**
hebephrenic, 468
katatonic, 468
paranoid form, 469
premature, 465
secondary, 464
senile, 372, 465, **469**
terminal, 464
Demoor's test, 555
Dendrites, 292
Density of urine, 188
Dentine, 40
Depraved habits, 422
Depressed fracture, 127
Depression, 419
states of, 435
Deprivation of the senses, 532
Dermis, 32
Destructiveness, 24, 415
Dextrose, 151
Diabetes, 80, **259,** 374
coma in, 260
urine in, 189
Diagnosis (mental deficiency), 518
Diaphragm, 50, 51
Diarrhœa, 251
management of, 269
spurious, 252
Diary, keeping a, 511
Diet after operation, 221
a good, 76
full, 161
middle, 161
milk, 161
sick, 161
Dietary requirements, 152
Diets, special, 162
Digestion, 70
Digestive symptoms in heart disease, 242
system, diseases of, 250
Dilatation, heart, 240
Diphtheria, 279
antitoxin, 280
Diplegia, 540
Dipsomaniacs, **473,** 545
Directed association, 353
Direct pyramidal tracts, 304
Dirty habits, 24, 422
patients, 175
Discipline, 16
moral, 11, 17
Discretion, 9
Disease, general, symptoms of, 224
venereal, 267
Diseases of bones, 235
of circulatory system, 236
of heart, 239
of joints, 235
of muscles, 235
of respiratory system, 243
of skin, 231
of tendons, 235
of veins, 238
Disgust, emotion of, 342
Disinfection of hands, 199
Dislocation, **131** 236
Disorders of the emotions, 418
of memory, 408
of mental functions, 399
of movement, 382
of nutrition, 389
of perception, 402
of sensation, 381
of volition, 413
Disorientation, 407
Disposal of refuse, 146
Disposition, 348
Disseminated sclerosis, 492
Dissociation, **365,** 378
Distorted memory, 409
Distractable patients, 408
Disturbed sleep, 242
Divergent bandage, 96
Dog bites, 119
Dolichocephalic head, 523
Domestic measures, 168
" Domino-boards," 578
Doors, locked, 17
Dormitories, 135
" Dorsal," 302
intestine, 287
Dotting test, 556
Double personality, 379
Douches, 210
Drachms, 167
" Draughts," 137
Drawsheet, 85, **171,** 172

Dreams, 350, **358**, 361
Dressing fantastically, 24
wounds, 111
Dressings, 201
after operation, 221
evaporating, 203
Dress, slovenliness in, 24
" Dribbling," 397
Drinks, 166
" Drop foot," 394
" Dropped ankle," 394
Dropsy, 240, 241, 258, **262**
Drowning, 121
Drug addiction and mental disorder, 476
deprivation symptoms, 477
habit, victims, 477
Drugs, mental disorders due to, 473
when illegal, 26
Dry inhalations, 211
Duct, bile, 68
pancreatic, 68
thoracic, 50, **63**, 74
Duodenum, 68, **72**, 75
surface-marking, 53
Dura mater, 295
Dusting, 140
powder, 199
Duties, special, 21
Dysentery, 268
Dysmenorrhœa, 259
Dyspepsia, 250
Dyspnœa, **185**, 246

Ear, external, 319
foreign body in, 126
inner, 319
insane, 238
middle, 319
Ears, abnormality of, 399, 523
Eating, disorderliness in, 24
Echolalia, 528
Eclampsic type, 531
Eclamptic type, mental deficiency, 531
Ectoderm, 284
Eczema, 232
Education Acts, 565
Efferent fibres, 294
Effleurage (massage), 217
Effusion, in pleurisy, 246
Egg preparations, 165
albumin, 150
Elation, emotion of, 343
Elbow-joint, fracture at, 129
Electric lighting, 139
shock, 114
Electricity, testing paralysed muscles, 384
Embolism, 373, **482**
Embryo, 79
brain of human, 288
Emergencies, 113
Emergency splints, 128
treatment of wounds, 111
Emotion, 341
admiration, 344
adrenal glands and, 493
anger, **342**, 344
awe (compound), 345
disgust, 342
elation, 343
fear, 339, **341**
subjection, 343
tender, 343
unfixed, 364
wonder, 342
Emotional disturbance and mental defect, 562
states, complex, 344
Emotions, disorders of, 418
Employment, 145
Empyema, 246
Enamel, teeth, 40
Encephalitis lethargica, 480
Encephalon, 295
Endemic fevers, 274
Endocarditis, **239**, 261
Endocrine glands, 73, **80**, 534, 535
and mental deficiency, 564
and mental disorders, 493
Endoderm, 284
Endurance, 11
Enema, glycerine, 205
medicinal, 206
normal saline, 455
nutrient, 205
oil, 205
purgative, 204
saline, 206
simple, 204
soap, 204
turpentine, 205
Enfeeblement, 423
mental, states of, 462
Environment, 559
Environmental causes, mental defect, 561
Envy, 345
Enzyme (plasma), 54
Enzymes, 70
Epicanthus, **524**, 535
Epicritic fibres (nerve), 310
functions, **380**, 381
sensory nerves, 322
Epidermis, 32
Epigastric region, 53
reflex, 387

Epilepsy, 116, 373, **427**
and hysteria, differential diagnosis, 433
and mental deficiency, 564
Jacksonian, 431
major, 428
minor, 428
Epileptic, aura, 428
character of, 429
cry, 429
furor, 429
type (mental deficiency), 531
Epiloiac type, 539
Epiphyses, 40
Epistaxis, 110
Epsom-salts, 118
Error, physiological, 327
Erysipelas, 271
Escape of patients, 25
Esmarch's tourniquet, 106
Ethmoid bones, 40
Etiology, 518
" Eusol," 88, **194**, 197
Eustachian tube, 319
Evacuant suppositories, 207
Evaporating dressings, 203
pack (bath), 213
Evening meal, 506
" Evil Eye," 368
Evolution and adaptability, 332
of nervous system, 283
of cerebro-spinal system, 286
of spinal cord, 287
Exaltation, 420
states of, 441
Examples of orders, 17
Excitement, 420
states of, 441
Excreta, 75
Excretion, 76
Excretory disorders in mental disease, 398
system, 31
observation of, 186
Exercise, 143
Exhaustive stupor, 457
Exophthalmic goitre, 81, **272**
and thyroid, 493
Expectoration, 243
Experimental psychology, 331
Experiments, animal, 324
Expiration, 66
Expired air, 67
Extension, 49
(fractures), 215
Extensor muscles, 37
stronger than flexors, 451
Extras, 162
Extrinsic causes, mental defect, 561
Eye, 315
abnormalities, 524
Eye, accommodation, 316
bandage, 102
" evil," 368
foreign body in, 125
retina, 291
symptoms in nephritis, 258
Eyeball, muscles of, 316
Eyelids, 318

Face, area, 297
bones of, 40
flushing of, 252
Facial nerve, **307**, 308, 315
Facile patients, 423
Faddists, 400
Fæcal vomit, 183
Fæces, observation of, 183
Fainting, 115, **229**, 241
Fallopian tubes, 78
Faradic current, 384
Farming, 585
Fascia, 34
Fascination, 345
Fat, 31, **33**
Fats, 69, 74, **150**
Fatty degeneration, 240
Faulty habits, 24, 422
Fear, bodily changes in, 340
emotion of, 339, **341**
Feeble-minded, 519
American researches, 560
legal definition, 542
Feeding, artificial, 163
instinct, 344
irregular, 156
patients, 162
" Feeling tones," 393
Fehling's solution, 189
Femoral artery, 62
hæmorrhage, 109
Femur, 47
shaft, fracture, 130
Fenestra ovalis, 319
Ferments, 70
Festinant gait, 394
Fever, 226
acme, 226
decline, 226
invasion, **226**, 274
rheumatic, 260
scarlet, 276
typhoid, 275
typhus, 265
Fevers, endemic, 274
epidemic, 274
specific, 274
sporadic, 274
" spotted," 481
Fibres, afferent, 294
muscle, 34
Fibrillary twitching, 385

Fibrin, 54
Fibrinogen, 54
Fibro-cartilage, 39
Fibula, 47
  fracture of, 131
" Fidgetiness," 525
Fifth nerve, **307**, 315
" Fighting attitude," 395
Figure-of-eight bandage, 95
Finger bandage, 98
Fingers, claw, 394
  webbed, **525**, 535
Fire, 120
  alarm, 21
  duties, 21
Fireman's lift, 84
Fires, open, 139
Firmness, 11
First aid, 83
    emergencies, 114
Fissure, great longitudinal, 296
  of Rolando, 296
  of Sylvius, 296
Fissures of brain, 296
Fist, closed, bandage for, 93
Fits, 117
  epileptic, 396
  screaming, 525
Flatulence, 251
Flatus, 255
Fleas, 141
Flexion, 49
Flexor muscles, 37
    weaker than extensors, 451
Flickering, 385
Flies, 141
Flight, instinct of, 339, **341**
" Flight of ideas," 406
Floors, polished, 140, 158
Fluid, cerebro-spinal, 295
Fluids, administration of, 162
Flushing, 241, 252
Focussing (eye), 315
Fœtus, 79
Folie circulaire, 445
Fomentations, hot, 202
Food, preparation of patient for, 162
  refusal of, 423
  supply, 150
Foods, nitrogenous, 69
Foot, 47
Force, application of, 24
Forearm, fracture of, 129
Forebrain, 288
Foreign body in eye, 125
  in air-passages, 125
  in ear, 126
  in nose, 126
  in vomit, 183
Foreign body, removal of, 125
Forgetfulness, temporary, 358
Formalin, **195**, 198, 200
Foul-smelling sputum, 186
Foundling Hospital, 2
Four-tailed bandage, 102
Fourth ventricle, 287, **303**
Fowler position, 221
Fracture beds, 173
  boards, 85, 129
  clavicle, 129
    arm-sling for, 90
  Colles's, 129
  comminuted, 127
  complicated, 127
  compound, 126
  depressed, 127
  elbow-joint, 129
  femur, 130
  fibula, 131
  forearm, 129
  greenstick, 127
  humerus, 129
  impacted, 127
  patella, 131
  Pott's, 131
  radius, 129
  ribs, 130
  tibia, 131
Fractures about ankle-joint, 131
  extension in, 215
  impacted, 127
  in the insane, 236
  in senile cases, 473
  simple, 127
Fragility of bones in G.P.I., 490
Free association, 353
Fresh-water polyp, 284
Freud, Professor, Vienna, 376
Friar's balsam, 109
Froebel, 575
Frontal bones, 40
  lobe, 296
Frost-bite, 117
Fugue, **379**, 397
Furor, epileptic, 429

Gait, festinant, 394
Gall-bladder, 68
Galvanic current, 384
Ganglia, basal, 289, **301**, 335
  involuntary, 286
  nerve, 285
  prevertebral, 312
  voluntary, 286
Ganglion, 304
  Gasserian, 308
  overmouth, 286
  undermouth, 286
Gangrene, 117, **237**
Gardening, 585

Garfield, President, death of, 461
Gas, coal, 125
poisoning, 125
sewer, 125
Gasserian ganglion, 308
Gastric glands, **69**, 75
juice, 69, **71**
ulcer, pain in, 251
Gauze, boracic, 201
cyanide, 201
iodoform, 201
perchloride, 201
sal alembroth, 201
Gelatin, 150
General paralysis, children, 541
of the insane, 268, **483**
bed sores in, 490
congestive attacks in, 488
febrile attacks in, 488
fits in, 488, 490
fragility of bones in, 490
management of, 490
nursing of, 490
physical signs, 487
quarrelsomeness in, 490
remissions, 487
retention of urine in, 490
second stage, 488
third stage, 489
with depression, 489
with excitement, 485
without excitement or depression, 490
Genetous type, mental deficients, 530
Geniculate body, **317**, 320
Germs, 263
Giddiness, 241, 252
Glacial periods, 333
Gland, lachrymal, 318
pineal, 81, **303**
pituitary, 81
prostate, 78
thymus, 81
thyroid, 80
diseases of, 272
Glands, adrenal, 50, **81**, 313, 375
and emotions, 493
ductless, 73, 80
diseases of, 493
endocrine, 80
and mental deficiency, 564
and mental disorders, 493
gastric, **69**, 75
intestinal, 75
lymphatic, 63
Glands, parathyroid, 81
parotid, 68
salivary, **68**, 75
sebaceous, 33
sublingual, 68
submaxillary, 68
sweat, 33
Glenoid cavity, 46
Gliding joints, 48
Globulin, 150
serum, 58
Glosso-pharyngeal nerve, **307**, 312, 315
Gloves, rubber, 220
Glucose, 151
Gluten, 69, 150
Glycerine enema, 205
Glycogen, 74
Glycosuria, 259
Goddard's adaptation test, 555
Goitre, **81**, 272
exophthalmic, 81, **272**
and thyroid, 493
"Golden ointment," 193
"Golden rule," 10
Gooch splinting, 214
Gossip, 9
Grand mal, 116, **428**
Granular layer, cortex, 300
Graves' disease, 272
Great sciatic nerve, 309
Greenstick fracture, 127
Gregarious instinct, 343
Grey columns of spinal cord, 305
matter, **293**, 305
Gristle, 39
Groin, temperature in, 180
Grunting, 185
Gullet (*see* Œsophagus), 50, **68**
Gums, 250
Gusts of passion, 525
Gyri, 296

Habit, improper, 422
injurious, 422
insane, 421
spasms, 386
Habits, 347
"Habits, bad," 525
children, 573
degraded, 422
depraved, 422
dirty, 24, 422
faulty, 24, 422
Hæmatemesis, **110**, 183, 186
Hæmatoma auris, 238
Hæmoptysis, **110**, 130, 186, 249
Hæmorrhage, 105
arterial, 105
capillary, 107
carotid, 109

Hæmorrhage, cerebral, 113, 295, 373
cold applications in, 109
femoral, 109
hot water in, 109
internal, 109
intracranial, 116
lungs, 110
nose, 110
radial, 109
reactionary, 110
secondary, 110
stomach, 110
ulnar, 109
venous, 107
Hæmorrhoids, 238, 239
Hæmothorax, 130
Hair follicles, 32
Hallucinations, 350, 359, **403**
as positive sign, 467
auditory, **401**, 436, 443
evidence of presence of, 405
historical personages, 404
visual, 443
Hand, bandage for, 92
bones of, 46
disinfection of, 111, **199**
Hanging, 121
" Hanging head," 393
Hate, 345
Haunch bones, 44 (*see* Innominate)
Hauser, Kaspar, 533
Head, bandage for, 90
box-shaped, 537
brachycephalic, 523
stigmata, 522
Headache, 225
Health, management of, 499
mind in, 330
Hearing, 318
centre, 298
Heart, 54, 55
auricles, 56
dilatation of, 240
disease, 239, 261
causation, 240
digestive symptoms, 242
hypertrophy, 239
pain in, 242
signs, 240
special nursing, 242
surface anatomy, 51
Heat, effects of, 117
sensations of, 305
Heating, 138
Heatstroke, 117
Hebrew type, mental deficiency, 541
" Hectic " temperature, 244
Hemianæsthesia, 381
Hemiplegia, 116, 382, **482**
crossed, 540
Hemispheres of cerebellum, 303
of cerebrum, 296
Hepatic artery, 63
vein, 63
Herd instinct, 343
Heredity, 368
as cause of mental deficiency, 559
Hereditary forms of mental disease, 369
Hernia, **254**, 535
Herpes, **238**, 247
labialis, 182
High-tension pulse, 181
Hill Folk, 560
Hindbrain, 288
Hinge-joints, 48
Hip, bandage for, 91
Hippocrates, oath of, 10
Historical personages, hallucinations, 404
History of legislation (mental deficiency), 565
of mental defectives, 560
Home life, mental defectives, 569
Homing pigeon, 339
Honesty of purpose, 12
Honour, breach of, 9
Hormones, **73**, 80
Hospital, Foundling, 2
Knights of St. John, 2
meaning of, 2
mental, 1
reputation of, 11
rules, 16
Hot-air bath, 214
pack, 213
water bottles, 85, **173**
in hæmorrhage, 109
House-fly, 141
Howard's method, artificial respiration, 113
Howe, Dr., of Boston, 574
Humerus, 46
Humour, vitreous, 315
Huntington's chorea, 427
Hutchinson's triad, 532
Hyaline cartilage, 40
Hydra, 284
Hydrocele, 259
Hydrocephalic type, **530**, 558
Hydrocephalus, 481
Hydrochloric acid, 71, 119, 123
Hydrocyanic acid, 124
Hydrogen, 32
peroxide, 119, **194**, 197
Hydrophobia, 117
Hydrotherapy, 212
Hygiene, 133

Hyoscine, 452
Hyperæsthesia, 381
Hypermetropia, 318
Hyperpyrexia, 180
Hypertrophic type, mental deficiency, 530
Hypertrophy, heart, 239
Hypnotism in hysteria, 434
Hypodermic injections, 169
  syringe, 452
Hypogastric region, 53
Hypoglossal nerve, 307
Hysteria, 117, 355, **433**
  and epilepsy, differential diagnosis, 433
  bodily symptoms, 364
  hypnotism in, 434
Hysterical spasms, 386
Hystero-epilepsy, 433

Ice bag, 110, **204**
Ideal, nurse's, 3
  Dr. Mercier on, 4
Ideas, 350
  association of, 352
  buried, 363
  flight of, 406
  repressed, 363
Idiocy, amaurotic family, 541
  by deprivation, 533
Idioglossia, 527
Idiot, legal definition, 542
  (speech), 526
Idiots, 519
  Act, 566
  brain in, 301
  savants, 579
Ileum, **72**, 74
Iliac arteries, 62
  crest, 44
  region, 53
  veins, 59
Ilium, 44
Illegitimate pregnancy, 373
Ill-treatment of patients, 25
Illusion, 403
Image, 350
  auditory, 352
  mental, 350
  visual, 352
Imagination, evidence of, 556
Imbecile, 519
  classification, 545
  legal definition, 542
Imbecility, moral, 519
  (writing), 526
Immunity, acquired, 266
  active, 266
  passive, 266
  serums in, 266
Impacted fracture, 127
Imperial drink, 166
Improper habits, 422
Impulse, 414
Impulsive attempted suicide, 419
  obsessions, 417
Impulsiveness, 414
Incisor teeth, 41
Incoordination, 382
Incubation period, fevers, 274
Incus, 319
Index, cephalic, 523
  of size, 523
Indigestion, 250
Inertia, 413
Infantile type (mental deficiency), 534
Infantilism, 534
Infection and micro-organisms, 263
  prevention of, 265
Infectious diseases, nursing of, 200
  organisms, spread of, 264
Inferior maxillary nerve, 308
  mesenteric plexus, 312
  vena cava, **59**, 63
Inflammation, 228
Inflammatory type, mental deficiency, 531
Influenza, 269
Infragranular layer, cortex, 300
  level, 325
Inhalations, 211
  oxygen, 211
  steam, 211
Inheritance, ancestral mind, 333
Inhibitory obsessions, 417
Injections, hypodermic, 169
  rectal saline, 206
  saline, 206
Injurious habits, 422
Ink-blot test, 556
Innate causes, mental defect, 559
Innominate bones, 44
Inunction, cod-liver oil, by, 171
Insane ear, 238
  fractures in, 236
  habits, 421
  propensities, 421
Insanity, alcoholic, chronic, 475
  circular, 445
  curative treatment, 2, 513
  definition, Maudsley's, 400
  delusional, 459
  manic-depressive, 445
  mental deficiency and, 557
  toxic causes of, 373
Insect pests, 141
  and micro-organisms, 264
Insect's instinctive behaviour, 337
Insects, stings of, 119
Insomnia, 425, **503**
  baths, 507

Insomnia, drugs, 507
food, 507
massage, 507
Inspiration, 66
Instinct, 334
definition of, 339
feeding, 344
gregarious, 343
herd, 343
of acquisition, 343
of construction, 343
of curiosity, 342
of flight, 339, 341
of pugnacity, 342
of reproduction, 343
of repulsion, 342
of self-abasement, 343
of self-assertion, 343
parental, 343
sexual, 377
threefold aspect of, 338
Instinctive behaviour, insect's, 337
concealment, 341
tendencies, 354
Instincts, the, 337
McDougall's classification, 338
special definite, 340
Institutions, mental nursing in, 494
Instruments, 219
Insula, 296
Insulin, **80** 260
Intellect, motor side of, 326
Intellectual obsessions, 417
" Intelligence age," 553
Intelligence, general, 546
" Intelligence quotient," 553
Intelligence standards, 547
Binet-Simon, 548
Terman's, 549
tests, 546-557
Intention tremor, **385**, 492
Intercostal nerves, 309
Intermittent pulse, 181
Internal capsule, 302
hæmorrhage, 109
secretions, 374
" Interosseous attitude," 394
Intestinal colic, 252
glands, 75
obstruction, 255
Intestine, dorsal, 287
large, 68, **74**
small, 68, **74**
Intestines, **50**, 126
Intoxicating liquors, 26
Intracranial hæmorrhage, 116
Intravenous saline, 207
Intrinsic causes, mental defect, 559
Introspection, 331
Inunction, 171
Invasion (fever), **226**, 274
Invertebrata, 287
Investigation, mental state, 498
Involuntary ganglia, 286
nervous system, 311
evolution of, 286
Involutional melancholia, 372
Iodine, 87
group of antiseptics, **191**, 197
tincture of, 111, **194** 197
Iodoform, **194**, 197
gauze, 201
Ireland, Dr., classification, mental defectives, 530
Iris, 316
colour of, 369
speckled, **524**, 535
Iron, 32
hydrous peroxide of, 122
tincture of, 109
Irregular feeding, 156
pulse, 181
Irritant poisons, 123
Ischial tuberosity, 44
Ischium, 44
Island of Reil, 296
Itard, Dr., 574
" Izal," **194**, 197

Jackson, Hughlings, neurologist, 431
Jacksonian epilepsy, 431
fits, 383
Jaundice, 252, **253**
Jejunum, 72
Jelly, calves' foot, 166
-fish, 284
Jeyes' fluid, 159, **194**, 197
Joints, 48
ball-and-socket, 48
Charcot's, 483
deformities of, 235
diseases of, 235
gliding, 48
hinge, 48
movements at, 49
pivot, 48
unnatural mobility at, 236
Judgment and reason, 355
Juice, meat, 165
Junket, 164

Kallikak family, 560
" Kalmuck " type, mental deficient, 530
Katatonia, 457
Katatonic stupor, proportion of, 469
Kathode, 384
Keeping of charts, 190
Keller, Helen, 533, **575**
Keys, lying about, 23
Kidneys, 50, 53, **77**, 256

Kindergarten methods, 575
Kleptomania, **417**, 545
Kneading (massage), 217
Knee-cap, 47
  jerk, **383**, 525
Knee reflex, 387
Knees, use of, 24
Knights of St. John, 2
Knitting and reading, 326
Knot, clove-hitch, 108
  granny, 108
  reef, 108
  surgical, 108
Knotted bandage, 101
Korsakov's disease, 475

Laborde's method, artificial respiration, 113
Laburnum, 124
Labyrinth, 319
Lachrymal gland, 318
  sac, 318
Lactation and mental disorder, 480
Lacteals, 74
Lactose, 151
Lalling, 527
" Landmarks," 51
  abdomen, 52
Language, 321
Larynx, 64
Lateral white column of cord, 305
  ventricles, 287
Laws for protection of patients, 25
Lead lotion, 203
  poisoning, 374
" Learn by experience," 327
Learning to write, 578
Left-hand writing, 529
Leg area, 297
Legal definitions: idiot, imbecile, 542
Legislation, history of, 565
Legs, to prepare for examination, 158
Legumin, 69, 150
Lemonade, 166
Lens (eye), 315
Letters, patients', 10
Leucocytes, 54
Level, cord, 324
  infragranular, 325
  medullary, 324
  polymorphic, 325
  pyramidal, 326
  red nucleus, 325
  supragranular, 326
  thalamo-striate, 325
Levels, physiological, 323
Liberty, patients', 6
" Life age," 553
Life is movement, 326
Lift, fireman's, 84
Lifting heavy patients, 23
  injured, 83
Ligament, Poupart's, 52
Ligaments, 48
  lax, 535, 539
Lighting, artificial, 139
  electric, 139
  of ward, 158
" Lightning pains," 483
Limbic lobe, 298
Limbs, abnormalities of, 524
  lower, 44, **47**
  upper, 44, **46**
Lime-water, 119
Linen, clothing, 147
Lipase, 72
Lips, observation of, 182
Liquor Cresolis Saponatus, 88
Lisping, 527
" Listerine," 198, 199
Listlessness, 13
Litmus paper, 188
Liver, 50, 53, **68**
Loathing, 345
Local anæsthetic, 381
Locked doors, 17
Lockjaw, 117
Locomotor ataxia, 268, **483**
  " crises " in, 482
" Look and say " method, 578
Loss of flesh, 252
  of weight, 228
Lotion, lead, 203
  spirit, 203
Louse, body, 234
  crab, 234
  head, 234
Love, 345
Lumbar nerves, 309
  plexus, 309
  puncture, 296
  region, 53
  vertebræ, **42**, 43
" Lunacy," 399
Lunacy Act (1890), 25
  Acts, 565
  laws, 16
Lungs, 64, 65
  hæmorrhage from, 110
  inflammation of, 247
  surface anatomy, 51
  tubercular disease, 248
Lupus, 266
Lymph, 63
Lymphatic glands, 63
  system, 63
Lymphocyte, 80
Lysis, **223**, 274
Lysoform, 195
Lysol, 88, **193**, 196, 200

McDougall's classification, instincts, 338
Macdowall, Miss, 575
equipment, 580
system, 577
Macrocephalic type of mental deficiency, 537
Magnesia, calcined, 122
Major epilepsy, 428
Malaria, 142
spread of, 265
Malleus, 319
Malingerers, 545
Maltose, 151
Man as animal, 335
Mandible, 40
Mania, acute, 442
delirious, 453
chronic, 443
recurrent, 445
religious, 376
simple, 441
transient alcoholic, 474
Manic-depressive insanity, 445
psychosis, 445
Manual restraint, 450
teaching, 581
Many-tailed bandage, 102
Margarine, 155
Marriage, 373
of cousins, 370
Marrow, red, 39
Mask, Parkinson's, 491
Massage, 217
effleurage, 217
kneading (pétrissage), 217
sprained wrist, 218
tapotement, 217
Mastication, **70**, 155
" Maternal impressions," stories of, 561
Mat-making, 584
Maudsley's definition of insanity, 400
Maxilla, inferior, 40
superior, 40
Maxillary nerve, 308
Maze test, 556
Meal, evening, 506
Measles, 277
Measures, domestic, 168
Measuring urine, 187
Meat juice, 165
Mechanical restraint, 453
Median nerve, 309
Medicated bath, 214
Medicinal enemata, 206
suppositories, 207
Medicine, refusal of, 168
Medicines, administration of, 167
Medulla, 288, 291, **303**
Medusa, 284
Megalencephalic type, mental deficiency, 537
Melæna, 183
Melancholia, 436
acute, 438
agitated, 438
chronic, 438
delusional, 438
involutional, 372
recurrent, 445
simple, 438
Membrane, mucous, 69
tympanic, 319
Memory, 351
disorders of, 408
Mendelism, 369
Meninges, 295
Meningitis, 480
cerebro-spinal, 481
tuberculous, 480
Menopause, 259
Menstruation, 190, **259**
Mental condition, estimation of, 401
management, 500
confusion, 455
deficiency and defectives, 518
Act, 519, 542, **566**
acquired causes, 561
alcohol and, 563
amaurotic family idiocy, 541
anatomical classification, 533
and insanity, relations, 557
and tuberculosis, 563
ante-natal causes, 561
classification, Dr. Ireland's, 530
cretinoid type, 532, **538**
definitions, legal, 542
practical, 543
"deprivation of senses," 532
doubtful causes, 562
eclampsic type, 531
emotional disturbance and, 562
endocrine glands and, 564
environmental causes, 561
epilepsy and, 564
epileptic type, 531
epiloiac type, 539
extrinsic causes, 561
genetous type, 530
Hebrew type, 541
history of, 560
home life, 569
hydrocephalic type, 530
hypertrophic type, 530
infantile type, 534
inflammatory type, 531

Mental deficiency and defectives, innate causes of, 559
intrinsic causes of, 559
" Kalmuck " type, 530
lactation and, 480
macrocephalic type, 537
megalencephalic type, 537
microcephalic type, **530**, 535
Mongolian type, **530, 534**
natal causes, 561
paralytic type, 531, 540
plegic type, 540
post-febrile type, 531
natal causes, 561
progressive type, 541
school training, 574
syphilis, 563
syphilitic type, 532
" Tartar " type, 530
traumatic type, 531
treatment, 564
vicious circle, 564
disease, predisposition to, 369
psychogenic causes, 371
diseases, alcohol and, 473
attitudes associated with, 395
cocaine and, 476
drug addiction and, 476
drugs and, 473
excretory disorders in, 398
hereditary forms of, 369
suggestion in, 8, **514**
disorder, pregnancy and, 478
disorders, due to alcohol, 473
due to morphine, 476
nature of, 5
puerperal, 478
enfeeblement, states of, 462
faculties, development in child, 547
function, disorders of, 399
hospital, 1
objects of, 7
images, 350
nursing in institutions, 494
principles of, 512
state, investigation of, 498
symptoms, psychological aspect of, 359
Mercier, Dr., on ideals, 4
Mercury, ammoniated, 193
biniodide, **193**, 196, 200
perchloride, 87, **192**, 196, 200
preparations, **192**, 196
salts of, 123, 124
inunction, 171
yellow oxide of, 193
Mesenteric plexus, inferior, 312
Mesentery, **51**, 68
Mesocephalic cranium, 523
Mesoderm, 286
Metacarpal bones, 46
Metaphysics, 331
Metatarsal bones, 47
Methylated spirit, **195**, 198
Metropolitan Asylums Board, 566
Mice, 142
Microbes, 263
Microcephalic type, mental defective, 530, **535**
Micro-organisms, 263
as causes, 374
diseases due to, 266
infection and, 263
insects and, 264
Midbrain, 296, 288, **302**
Middle ear, 319
Midriff (diaphragm), 50
Milk coffee, 165
contaminated, 264
cow's, 154
preparations, 164
tea, 165
teeth, 41
to pasteurise, 164
to peptonise, 164
Mind, ancestral, 336
inheritance of, 333
and body, interaction of, 390
brain the seat of, 334
defective, 546
in health, 330
the normal, 336
the unconscious, 357
what is the ? 331
" Mind's eye," 352
" Mind's muscles," 352
Minerals, 69
Minims, 167
Minor epilepsy, 428
Mirror writing, 529
Mitral valve, 57
Mob, panic of a, 337
Molar teeth, 41
Mole, the, 333
" Mongol," 520, **534**
Mongolian type, mental deficient, 530, **534**
" Monkey hand," 394
Monoplegia, **382**, 540
" Monsters," 521
Montessori, Dr. Maria, 575
system, 576
Moral aspect of discipline, 17
discipline, 11
imbeciles, legal definition, 542
classification, 545
imbecility, 519
Moron, 519
Morphia, 452

Morphine, **125**, 374
mental disorder due to, 476
when illegal, 26
Mortification, 237
Mosquito, 265
Moths, 141
Motor cell, 284
functions, area, 297
tracts, postures from disease of, 394
Mott, Sir Frederick, 375
Mouth, 64, 67, 75, 250
abnormalities, 524
septic, 191
temperature in, 179
Movement, object of, 326
Movements at joints, 49
automatic *v.* voluntary, 326
disorders of, 382
passive, 218
stereotyped, 416
Muco-purulent sputum, 186
Mucous membrane, 69
Mumps, 68
Muscle fibres, 34
insertion, **34**, 37, 49
origin, **34**, 37, 49
spasms, 525
striated, 35
striped, 35
unstriated, 35
unstriped, 35
wasting of, 235
Muscles, 31
abductor, 37
adductor, 37
biceps, 36
deltoid, 49
diseases of, 235
eyeball, external, 316
extensor, 37
flexor, 37
function of, 36
involuntary, 35
voluntary, 35
" Muscles of the mind," 352
Musculo-spiral nerve, 309
Myelinated axons, 293
Myelin sheath, 293
Myelitis, 383
Myocarditis, **239**, 261
Myopathy, 394
Myopic sight, 316
Myosin, 150
' Mystery bags," 578
Myxœdema, 81, **273**
and thyroid, 493
Myxoid substance, 524

Nails, finger and toe, 33
Narcotic poisons, 124
Nasal bones, 40
field (vision), 317
Natal causes, mental deficiency, 561
Natural selection, 282
ventilation, 136
Nausea, 227
Nebula (cornea), 524
Needle bath, 213
Neglect of patients, 25
Negroes, 520
Neo-salvarsan, 268
Nephritis, 256
convulsions in, 258
eye symptoms in, 258
Nerve, anterior crural, 309
auditory, 308, **320**
cells, 284, **291**, 309
cervical, 309
coccygeal, 309
cochlear, 320
eighth cranial, 320
epicritic sensory, 322
facial, **307**, 308, 315
fibres, 294
epicritic, 310
fifth, **307**, 315
filaments in skin, 32
glosso-pharyngeal, **307**, 308, 312, 315
hypoglossal, 307
intercostal, 309
lumbar, 309
maxillary, inferior, 308
superior, 308
median, 309
musculo-spiral, 309
ninth, **307**, 315
olfactory, 308
ophthalmic, 307
optic, 308
peripheral, 307
phrenic, 309
popliteal, external, 310
posterior tibial, 310
protopathic fibres, 310
sensory, 322
radial, 309
sacral, 309
sciatic, great, 309
seventh, **307**, 315
spinal, 308
spinal accessory, **307**, 308, 312
thoracic, 309
trigeminal, **307**, 308, 315
twelfth, 307
ulnar, 309
vagus, **307**, 308, 312
vestibular, 320
Nervous " breakdown," 355
disorders, postures in, 393
system, 31

Nervous system, anatomy of, 291
autonomic, **311**, 312
cerebro-spinal, evolution of, 286
evolution of, 283
how it works, 323
involuntary, 311
evolution of, 286
Nest-building, 338
Nettle rash, 232
Neural tube, 288
Neurasthenia, 355, **431**
Neuroglia, 293
Neuron, **291**, 294
Neuropathic states, 559
Neuroses, 377, **431**
Neurosis, anxiety, 391, **432**
obsessional, 434
New patients, reception of, 494
" Night terrors," 525
Ninth nerve, **307**, 315
Nipples, 51
Nitric acid, 119, **123**
Nitrogen, 32, 67
Nitrogenous foods, 69
Normal, definition of, 336
mind, 336
saline, 206
enemata, 455
temperature, 133, **179**
Nose, 64
abnormalities of, 524
foreign body in, 126
hæmorrhage from, 110
Nucleus, cell, **30**, 291
red, **289**, 291, 303
Nurse and patient, relations of, 7
charge, 157
qualifications of, 7
Nurses, confidential nature of work, 90
general duties of, 1, **15**
ideal, 3
Nursing, infectious disease, 200
special, heart disease, 242
Nutrient enemata, 205
suppositories, 207
Nutrition, disorders of, 389
Nystagmus, **492**, 524, 535

Oath of Hippocrates, 10
Observation, 19
of appetite, 182
of breath, 182
of respiratory system, 184
Obsessional neurosis, 434
Obsessions, 416
impulsive, 417
inhibitory, 417
intellectual, 417
Obstruction, intestinal, 255
Occipital bones, 40
lobe, 296
Occupation, 500
therapy, 506
Odour of breath, 251
Œdema, 241, **253**
Œsophagus, 50, **68**
Oil, enema, 205
of vi riol, 123
Ointments 170
Olfactory bulb, 313
lobes, 290
nerve, 313
Omelette, plain, 165
Onion, as application, 119
Opacity, corneal, 524
Open-air life, 142
methods, 159
treatment, 439, 443
Open fires, 139
Operation, after-care, 221
care of bowels, 221
diet after, 221
dressings after, 221
nursing after, 221
preparation of patient for, 220
room for, 219
Operations, 218
Ophthalmic nerve, 307
Ophthalmoplegia, 540
Opium, **125**, 374, 452
Optic commissure, 317
nerve, 308
tracts, 317
Orbit, 318
Orderliness, 15
Orders, examples of, 17
" Organ " of body, 30
Organic materials, 32
reflexes, 324
sensations, 349
Organisation of the sentiments, 345
Orthopnœa, 185
Os calcis, 47
pubis, 44
Ossicles, 319
Ossification of bone, 40
Osteitis deformans, 537
Ova, 78, 79
Ovaries, 50, **78**, 79, 82, 375
" Overheated," 134
Over-pressure, school, 562
Oxalic acid, 123
Oxidising agents, 197
Oxycephalic head, **523**, 530
Oxygen, **32**, 67
group of antiseptics, **194**, 197
inhalations, 211
Ozone, 142

Pack, as restraint, 212

Pack, cold, 212
evaporating, 213
hot, 213
wet, 212
Padding splints, 215
Pain, as symptom, 380
character of, 179
in cancer of stomach, 251
in dyspepsia, 251
in gastric ulcer, 251
in heart disease, 242
in respiratory disease, 244
" lightning," 483
muscular, 235
observation of, 225
referred, **313**, 380
sensations of, 305
Palatal reflex, 387
Pallor, 241
Palmar arch, 62
Palpebral fissure, 524
Palpitation, **241**, 252
Pancreas, 50, 68, 80
Pancreatic duct, 68
Panic of a mob, 337
Panoramic vision, 317
Papuans, 520
Paræsthesia, 382
Paraffin wax, 118
" Paraform," 195, 198
Paraldehyde, 452
Paralysed muscles, testing, 384
Paralyses, crossed, 382
Paralysis agitans, 491
pseudo-hypertrophic, 386
spastic, 385
Paralytic type, mental defectives 531, **540**
Paranoia, 378, 379, **461**
Paranoid temperament, 462
Paraplegia, **382**, 540
Parasites, common, 280
Parathyroids (glands), **81**, 375
Parental instinct, 343
Parents, consanguinity of, 560
Parietal bones, 40
lobe, 296
Parkinson's mask, 491
Parole, 502
Parotid glands, 68
Passion, gusts of, 525
Passive movements, 218
Pasteurisation of milk, 153, **164**
Patella (bone), 47
fracture of, 131
Patient, attitude of, 178
preparation of, for food, 220
operation, 162
Patients, carnal knowledge of, 25
counting, **17**, 120
dirty, 175
Patients, distractable, 408
escape of, 25
facile, 423
feeding, 162
ill-treatment of, 25
letters, 10
liberty, 6
neglect of, 25
new, reception of, 494
position, 178
preparing for examination, 157
removal of, 508
transfer of, 508
washing, 174
Peduncles of cerebellum, 303
of cerebrum, 302
" Peg-board," 577
Pelvis, 43
false, 44
true, 44
Penguin, 333
Penis, 78
Pepsin, 70
Peptones, 150
Peptonise milk, to, 164
Percept, 350
Perception, 350
disorders of, 402
Perchloride gauze, 201
of mercury, 87, **192**, 196, 200
Perflation, 137
Pericarditis, **239**, 261
Pericardium, 50, 55
Perineum, bandage for, 105
Periosteum, 39
Peripheral nerves, 307
Peristalsis, 73
Peritoneum, **50**, 68
Peritonitis, 255
Permanent teeth, 41
Permanganate of potash, 119
Peroxide, hydrogen, 119, **194**, 197
Persecution, delusions of, 412
Personality, double, 379
Persuasion, 515
Petit mal, 116, **428**
Pétrissage (massage), 217
Phalanges (bones), 47
Phantasy, 361
Pharynx, **64**, 68
Phenol, **193**, 196
Philosophies, the, 331
Phonic method (learning to read), 578
Phosphorus, 32, 123, **124**
Phrenic nerves, 309
Phthisis, **248**, 266
Physiogenic causes of mental disease, 371
Physiological error, 327
levels, 323
stigmata, 525

Physiology, 28
Piarachnoid, 295
' Pick-a-back," carrying, 84
Picric acid, 118, **194**, 197
Pigeon, homing, 339
Piles, 238, 239
Pills, 168
Pineal gland, 82, 302
Pinna, 319
" Pin-point " pupils, 388
" Pitting on pressure," 263
Pituitary body, **81**, 375
Pivot joint, 48
Placenta, 79
Plague, 265
Plantar arch, 62
reflex, 323, 387, **388**
Plasma, 53, **54**
enzyme, 54
Plaster of Paris, 216
Play (rivalry), 347
Plegic type, mental defective, 540
" Plenum " system of heating, 138
Pleura, 50, **51**
parietal, 65
visceral, 65
Pleurisy, 246
effusion in, 246
Plexus, brachial, 309
cardiac, 312
cervical, 309
inferior mesenteric, 312
lumbar, 309
sacral, 309
solar, 304, **312**
superior mesenteric, 312
Pneumonia, acute, 247
Poisons, 123
as causes of insanity, 373
convulsants, 123, **124**
corrosive, 123
cupboard for, 167
irritant, **123**, 124
narcotic, 123, **124**
Polished floors, 140, **158**
Pollen, 79
Polymorphic layer, 300
Polyneuritic psychosis, 475
Polyneuritis, 384
and alcohol poisoning, 473
Poisoning, 121
lead, 374
strychnine, 117
Polyp, fresh-water, 284
Pons, 203
Poor Law, 565
Popliteal artery, 62
nerve, external, 310
Poroplastic circlation, 63
splints, 214
Portal vein, 63
Position, " Fowler," 221
" Position sense," 289
Posterior tibial nerve, 310
white column of cord, 305
Post-febrile type, mental deficients, 531
Post-natal causes, mental deficients, 561
Posture, climbing, 395
Postures due to affections of the brain cortex, 395
in epileptic fits, 397
from atrophy, 394
from disease of motor tracts, 394
in nervous disorders, 393
Potassium, 32
permanganate, 119, **195**, 197
Pott's fracture, 131
Poultice, bread, 203
fig, 203
linseed (flax-seed), 202
mustard, 203
starch, 170, **203**
Poupart's ligament, 52
Powders, 168
Predisposition to mental disease, 369
Pregnancy and mental disorder, 478
illegitimate, 373
Premature dementia, 465
Pre-molar teeth, 41
Presbyopia, 316
Pre-senile cases, 470
Pressure-points, first aid, 106
Prevertebral ganglia, 312
Pride, 345
Primitive vertebrate, 288
Principles of mental nursing, 512
Printing, 584
Private houses, cases in, 567
nursing in, 509
Progressive delusional states, 460
types, mental deficiency, 541
Projection, **364**, 379
alcoholics and, 365
Prolonged hot bath, **212**, 443, 450
Promises, keeping, 13
Pronation, 49
Prone position, 49
Prostate gland, **78**, 82
Protargol, 193
Proteins, **32**, 69, 150
Protopathic fibres (nerve), 310
functions, **330**, 381
sensory nerves, 322
Protoplasm, **29**, 32
" Proud flesh," 193
Prudery, 362
Prune-juice sputum, 186
Prussic acid, 124
Pseudo-hypertrophic paralysis, 386
clonus, 389

Psycho-analysis, 366
therapy, 514
Psychogenic causes, mental disease 375
Psychological analysis, 355, **515**
aspect, mental symptoms, 359
Psychology, a biological science, 330
abnormal, 529
definition, 330
methods of study, 331
Psychoneuroses, 355, 377, **433**
Psychoses, 377
Psychosis, manic-depressive, 445
polyneuritic, 475
Ptomaines, 123, **124**
Ptyalin, 70
Puberty, **372,** 558
Pubic bone, 44
Pubis, symphysis, 44
Puerperal mental disorders, 478
septicæmia, 374
Puerperium, mental disorder during, 478
Pugnacity, instinct of, 342
Pulmonary artery, 60
circulation, **56**, 61
tuberculosis, 266
valve, 60
vein, 61
Pulp (teeth), 41
Pulse, 58, **180**
beat, changes in, 241
bounding, 181
frequency of, 181
fulness of, 181
high tension, 181
intermittent, 181
irregular, 181
small, 181
thready, 181
Punctuality, 15
Puncture, lumbar, 296
Pupil, 316
" pin-point," 388
reflex, 387, **388**
Purgative enemata, 204
Purpose, honesty of, 12
Purulent sputum, 186
Pus in urine, **189,** 257
Pylorus, 70
Pyramidal layer, 300
tracts, 302
crossed, 304
direct, 304
Pyrexia, 180, **226**
Pyromania, 417

" Quotient, Intelligence," 553

Rabies, 117
Radial artery, 62
Radial hæmorrhage, 109
nerve, 309
Radiators, 138
Radius, bone, 46
fracture of, 129
Railway travel, 509
Rash, 231
Rationalisation, **356**, 360, 366, 376
Rats, 142
" Rattle," death, 222
Reaction of degeneration, 384
vestibular, 321
Wassermann, 532
Reactionary hæmorrhage, 110
Reading and knitting, 326
Reason and judgment, 355
Reasonable tendencies, 354
Recollection, act of, 351
Records, keeping of, 190
Recreation, 501
Rectal methods, 171, **204, 207**
Rectified spirit, **195,** 198
Rectum, **68**, 74
temperature in, 180
Recurrent bandage, 100
mania, 445
melancholia, 445
states, 444
Red nucleus, **289,** 291, 303
Re-education, **357**, 367, 516
Referred pain, **313**, 380
Reflex, abdominal, 387, **388**
action, **323,** 328, 386
anal, 387
ankle, 387, **389**
arc, 323
bone-tendon, 387
corneal, 387, **388**
cremasteric, 387
epigastric, 387
hearing, 321
knee, 387, **388**
palatal, 387
plantar, 323, 387, **388**
pupil, 387, **388**
sight, 321
spasms, 386
speech, 328
wrist, 387
Reflexes, deep, 387
organic, 324
skin, 387
superficial, 387
Refusal of food, 423
Refuse, disposal of, 146
Regression to a lower level, 379
Regularity of pulse, 181
Relations of mental deficiency and insanity, 557
Religious mania, 376
persuasion, 573

Removal of patients, 508
Report, essentials of, 19
of accident, 83
to medical attendant, 511
Repressed complexes, 377
Repression, 357, **377**
Reproduction, 78
instinct of, 343
Reproductive organs, 78
system, 31
disorders of, 259
in mental disease, 398
Repulsion, instinct of, 342
Reputation of hospital, 11
Researches, American: feeble-minded, 560
Resistiveness, 414
Resistive stupor, 457
Respiration, 64, **66**
artificial, 112
Cheyne-Stokes, 185
rate of, 244
Respiratory disorders in mental disease, 398
system, 31, **64**
diseases of, 243
observation of, 184
wasting in, 245
Responsibility, 573
for conduct, 6
Rest, 143
Restlessness, 415
Restraint, for boils, 453
chemical, 452
manual, 450
mechanical, 453
pack as, 453
when illegal, 26
Retardation, 406
Retention of urine, 258
Retina (eye), 291, **315**
neurons, 318
Reverence, 345
Reverse, bandage, 95
spiral, 96
Rheumatic fever, 260
Rheumatism, acute, 260
chronic, 262
Rhythm, appreciation of, 535
Ribs, 51
false, 43
floating, 43
fracture of, 130
true, 43
Rice, polished, 153
Rickets, skull in, 537
Rigor, **226,** 256, 385
Ringworm, 234
Rods and cones (retina), 319
Rolando, fissure of, **296,** 326
Roller bandage, 94
Rooms, cleaning, 140
single, care of, 159
Rotation, 49
Round-worms, 281
Rubber gloves, 199, **220**
Rubbish, collecting, 421
Rubro-spinal tract, 303
Rug-making, 584
Rules, hospital, 16
for protection of patients, 25
Rupture, 254 (*see* Hernia)
Rusty sputum, 186

Sacral nerves, 309
plexus, 309
Sacrum, 42
Safety-pins, 202
St. Vitus's dance, 261, **427**
Sal alembroth, 201
Saline enemata, **206,** 455
intravenous, 207
normal, 206
subcutaneous, 207
Saliva, 68, 69
Salivary glands, 68, 69, 75
Salivation, 397
Salts, 151
Epsom, 118
Salvarsan, 268
Sanitas, **195,** 195, 197
Scabies, 233
Scalds, 118
of throat, 118
Scaphocephalic cranium, 523
Scapula, 46
scaphoid, 524
Scarlet fever, 276
Schäfer's method, artificial respiration, 112
School-children, adenoids in, 562
defects of hearing, 562
of vision, 562
over-pressure, 562
School, recommendations, 579
training, mental deficiency, 574
Sciatic nerve, great, 309
Sclerosis, disseminated, 492
Scorn, 345
Scotland, Lunacy Laws, 26
Screaming fits, 525
Scrotum, 78
Sebaceous glands, 33
Seclusion, when illegal, 26
Secondary hæmorrhage, 110
Secretin, 73
Secretion, 69, **76**
Secretions, internal, 374
Secretory changes, 397
Sedatives, 453
dangers of, 508
Selective release, 329

Self-abasement, instinct of, 343
Self-assertion, instinct of, 343
Self-control, 12
Self-injury, 21
Self-mutilation, 422
Self-regarding sentiment, 346
Semicircular canals, 319
Senile dementia, 372, 465, **469**
  fractures in, 473
  insanity, 471
  mental disorders, 469
Senility, 372
Sensations, common, 349
  conveyance of, 305
  disorders of, 381
  of touch, 305
Sense impressions centre, 297
  of smell, 290
  of touch, 322
Senses, deprivation of the, 532
  special, 285, **313**
  training the, 569
Sensory cell, 284
Sentiment, 356
  self-regarding, 346
Sentiments, definition, 345
  organisation of the, 345
Sepsis, 86, **191**
Septicæmia, puerperal, 374
Septic teeth, 191
Serum albumin, **54**, 150
  and immunity, 266
  globulin, 54
Seventh nerve, **307**, 315
Sewage, 147
Sex, 372
Sexual characteristics, secondary, 82
  instinct, 377
  malpractices, 24, **422**
Shaking palsy, 491
Sheets, changing, 172
  waterproof, 173
" Shell-shock," 433
Shelter, open-air, 160
Shivering, 385
Shock, 114, **230**
  electric, 114
Shoemaking, 584
" Shoemaker attitude," 363
Shortness of breath, 241
Shower bath, 213
" Shut-in " personality, **462**, 466
Shyness, 362
Sick, cleansing the, 174
  rooms, 135
    care of, 158
    cookery, 164
    management of, 157
    requirements of, 157
Sighing, 185
Sight, 315
  centre for, 298
  reflex, 321
Sign, 177
Signs of nervous disorders, 380
Silk, clothing, 147
Silver preparations, **193**, 196
  nitrate, **193**, 196
Simple enema, 204
  fracture, 126
  mania, 441
Single-handed, managing, 23
Sitz bath, 213
" 606" (salvarsan), 268
Size, index of, 523
Skeleton, 30
Skilled craftsmen, 500
Skin, 31
  capillaries in, 32
  diseases of the, 231
  dryness of, 245
  functions of, 32
  reflexes, 387
Skull, **40**, 51
  in rickets, 537
Sleep and dreams, 358
  and insomnia, 503
  disturbed, 242
  normal, influences conducing to, 503
  observation of, 189
Sleeplessness, 228, **425**
  external causes, 504
  internal causes, 504
  management of, 505
" Sleepy sickness," **480**, 532
Sling, arm, large, 89
  for fractured clavicle, 90
" Slouching gait," 393
Slovenliness in dress, 24
Smallpox, 278
Small pulse, 181
Smell, 313
  centre for, 298
  sense of, 290
Snake-bites, 119
" Snout-sense organs," 288
Soap enema, 204
Soda, bicarbonate, 118, 119
Sodium, 32
Solar plexus, 304, **312**
Solution, Fehling's, 189
Somnambulism, 379
Sordes, 178
Sounds, unit, 321
Spasm, anal, 386
  clonic, 116, **385**, 428
  habit, 386
  hysterical, 386
  muscle, 525
  reflex, 386

Spasm, tonic, 116, **385**, 428
Spastic paralysis, 385
Spasticity, 383
Special baths, 212
sense sensations, 349
senses, 313
Speech, central processes, 527
centre, 297
defects, 526
motor side, 527
reflex, 328
requirements for, 526
sensory side, 321, **526**
Speed of nerve-conduction, 293
Spermatozoa, 78, 79
Sphenoid bone, 40
Sphincters, **67**, 70
Spica bandage, 96
Spinal accessory nerve, **307**, 308, 312
canal, 42, **304**
cord, 304
central canal of, 287
evolution of, 287
grey columns of, 305
rudiment of, 287
nerves, 308
Spiral bandage, 95
Spirilla, 86, **264**
Spirit lotion, 203
methylated, **195**, 198
of salts, 123
of soap, 170
rectified, **195**, 198
Spitting, 142
Spleen, 50, 53, **80**
Splinting, Gooch, 214
Splints, 214
emergency, 128
padding, 215
poroplastic, 214
Sponges, 283
Sponging, bath, 213
Sporadic fevers, 274
Spores, 263
"Spotted fever," 481
Sprained wrist, massage, 218
Sprains, 132
Sputum, 186
foul-smelling, 186
muco-purulent, 186
prune-juice, 186
rusty, 186
Squint, **524**, 535
Stammering, 527
Stapes, 319
Staphylococci, 264
Starches, 69
State institutions, 567
States, complex emotional, 344
neuropathic, 559
of confusion, 455
States of delirium, 453
of delusion, 459
chronic, 462
progressive, 460
of depression, 435
of enfeeblement, mental, 462
of exaltation, 441
of excitement, 441
recurrent, 444
Status epilepticus, 429
Steaming, preparations for, 211
Steam inhaler, 211
Stereoscopic vision, 317
Stereotyped movements, 416
Sterilisation, 86
of syringes, 169
Sternum, 43
Stertor, 185
Stigmata, 520
acquired, 521
anatomical, 520
congenital, 521
head, 522
of degeneration, 398
physiological, 525
Stings of insects, 119
Stomach, 50, 68, 70, 75
cancer of, 251
hæmorrhage into, 110
pain in cancer, 251
surface-marking, 53
Stools, blood in, 183
Strait-waistcoat, 453
Strangulation, 121
Strap, 453
Streptococci, 264
Stretcher, improvised, 83
Striate body, 289, 291, **301**
Stridor, 185
Stroke, apoplectic, 481
Stroking (massage), 217
Strychnine, 124
poisoning, 117
Study, methods of, 331
Stump, bandage for, 98, 99
Stunning, 115
Stupes, 202
Stupor, 403, **413**
anergic, 457
exhaustive, 457
katatonic, proportion of, 460
memory in, 458
resistive, 457
states of, 456
Stuttering, 527
Styptics, 109
Subclavian artery, 62
Subcutaneous saline, 207
Subconsciousness, 357
Subjection, emotion of, 343
Sublimate, corrosive, 123

Sublimation, **365,** 378
Sublingual glands, 68
Submaxillary glands, 68
Subnormal men, 337
Succus entericus, 75
Sudden death, 223
Suffocation, 120
Sugar in urine, 189
Sugars, 69
Suggestibility, 346
  affective, 347
  cognitive, 347
  conative, 347
Suggestion, in mental disease, 8 **514**
Suicide, 21
  impulsive attempted, 419
Sulphonal, 452
Sulphur, 32
Sulphuric acid, 119, 123
Sunstroke, **117,** 561
Superficial reflexes, 387
Superior mesenteric plexus, 312
  vena cava, 59
Supernormal men, 337
Supination, 49
Supine, 49
Suppositories, 207
  evacuant, 207
  medicinal, 207
  nutrient, 207
Suppression of urine, 257
Supragranular layer, 300
Suprarenal capsules, 81
Surface-marking (abdomen), 52
  duodenum, 53
  heart, 51
  stomach, 53
Suspicion, delusions of, 412
Sutures, 220
Sweat glands, 33
Sweating, 245
Sylvester's method, artificial respiration, 112
Sylvius, fissure of, 296
Sympathetic centres, 312
  chain, 312
  nervous system, 311, 313
Sympathetico-tonus, 375
Symphysis, pubis, 44
Symptom, 177
  pain as, 380
Symptoms of mental disorder, 380
  psychological aspect, 359
Synapse, 293
Syncope, **229,** 240, 241
Synovial fluid, 48
  membrane, 48
Syphilis, 267
  and mental deficiency, 563
Syphilis, spirillum of, 264
Syphilitic type, mental defective 532
Syringes, hypodermic, **169,** 452
  sterilising, 169
System, alimentary, 31, **67**
  autonomic nervous, 311, 312
  cerebro-spinal nervous, 295
    evolution of, 286
  circulatory, 31, **54**
    diseases of, 236
  digestive, 57
    diseases of, 250
  excretory, 31
    observation of, 186
  lymphatic, 63
  Macdowall, 577
  Montessori, 576
  nervous, 31
    anatomy of, 291
    evolution of, 283
    how it works, 323
    involuntary, 311
  reproductive, 31
    disorders of, 259
  respiratory, 31, **64**
  sympathetic nervous, 311, 313
  urinary, 77
    diseases of, 256
Systematised delusions, **411,** 461
Systemic circulation, **56,** 61

Tablespoons, 168
Tachycardia, 272
Tact, 11
Tailed bandage, 102
Tailoring, 584
Tapeworms, 281
Tapotement (massage), 217
Tapping, 217
Tarsal bones, 47
"Tartar" type, mental defective, 530
Taste, 314
  bud, 314
  centre, 298
Tea, 155
  milk, 165
Teaching arithmetic, 578
  manual, 581
Teaspoons, 168
Teeth, **40,** 250
  artificial, 496
  canine, 41
  cleaning, 146
  enamel, 40
  incisor, 41
  milk, 41
  molar, 41
  permanent, 41
  pre-molar, 41

Teeth, septic, 191
wisdom, 41
Temper, control of, 12
Temperament, 348
paranoid, 462
Temperature, axilla, 179
baths, 497
body, 133, **179**
groin, 180
hectic, 244
mouth, 179
normal, 133, **179**
rectum, 180
rooms, 139
ward, 158
Temporal bones, 40
field (vision), 317
lobe, 296
Tendencies, general indefinite, 346
instinctive, 354
special definite, 340
Tender emotion, 343
Tendons, diseases of, 235
Tents, open-air treatment, 160
Terman's intelligence tests, 549
revision tests, 549
Terminal dementia, 464
Testicles (*or* testes), **78,** 82, 375
Testing urine, 188
Tests, abbreviations, 556
Binet-Simon, 548
Bourdon's, 555
Burt, 554
cancellation, 555
cube, 556
Demoor's, 555
dotting, 556
Goddard's adaptation, 555
ink blot, 556
intelligence, 546-557
maze, 556
Tetanus, 117
Tetany, 525
Thalamus, 289, 291, **301,** 381
Thermometers, care of, 179
Third ventricle, 287, **301**
Thirst, 227
Thoracic duct, 50, **63,** 74
nerves, 309
vertebræ, **42,** 51
Thorax, 50
surface anatomy, 51
Thought, disorders of connective, 406
Threadworms, 280
Thready pulse, 181
Throat, cut, 121
scalding, 118
Thrombosis, **237,** 373, 482
"Throwback," 369
Thumb bandage, 98
Thymus gland, 82
Thyro-iodin, 81
Thyroid gland, 81
and exophthalmic goitre 493
diseases of, 272
hypertrophy of, 272
secretions, 375
Tibia, 47
fracture of, 131
Tibial artery, anterior, 62
posterior, 62
Tics, **386,** 525
Tidal breathing, 185
Tight-lacing, 66
Tincture of iodine, 111, **194,** 197
of iron, 109
Tissue, cancellous, 39
Toast water, 166
Toes, webbed, 525, 535
Toilet of sick, 174
"Tones, feeling," 393
Tongue, 250
observation of, 182
Tonic spasm, 116, **385,** 428
Tools, improper use of, 583
Touch, sensations of, 305
sense of, 322
Tourniquet, Esmarch's, 106, 107
Toxic causes of insanity, 373
Toy-making, 583
Trachea, 64, 68
Tracheotomy, 280
Tracts, pyramidal, 302
crossed, 304
direct, 304
Trade preparatory classes, 580
Training the senses, 569
Transfer of patients, 508
Transfusion of blood, 110, **210**
Transient alcoholic mania, 447
Trauma, 531
Traumatic type, mental defectives 531
Treat patient, not disease ! 513
Tremor, 385
intention, **385,** 492
Triangular bandage, 88
Tricuspid valve, **57,** 60
Trigeminal nerve, **307,** 308, 315
"Trombone tremor," 487
Trunk, 50
abnormalities of, 524
Truss (hernia), 255
Trypsin, 70, 72
T-shaped bandage, 102
Tube, Eustachian, 319
Fallopian, 78
Tubercle bacillus, 264
Tuberculosis, 266
and mental deficiency, 563

Tuberculosis, pulmonary, **248,** 266
Tumour, benign, 260
malignant, 260
simple, 260
cerebral, 492
Turpentine enema, 205
Twelfth nerve, 307
Twenty-four-hour specimen, urine, 187
Twitching, fibrillary, 385
Tympanic membrane, 319
Tympanum, 319
Typhoid bacillus, 264
fever, 275
nursing of, 276
Typhus fever, 265
Tyranny, 18

Ulcer, gastric, pain in, 251
varicose, 238
Ulna, 46
Ulnar artery, 62
hæmorrhage from, 109
Umbilical region, 53
Unconscious mind, 357
Unit characters, 369
sounds, 321
" Unpardonable sin," 411
Upholstering, 584
Uræmia, **258,** 374
Urates, 257
Urea, **77,** 256
Ureters, 77
Urethra, 77, 78
Uric acid, **77,** 256
Urinary system, diseases of, 256
Urine, 77
acidity of, 188
after operation, 221
albumin in, 189
bile in, 257
blood in, 189
collection of specimens of, 187
colour of, 188
density of, 188
deposit in, 188
diabetic, 189
examination of, 187
measuring, 187
pus in, **189,** 257
retention of 258
sugar in, 189
suppression of, 257
testing, 188
twenty-four-hour specimen, 187
Urinometer, 188
Urticaria, 232
Uterus, 50, **78**

Vaccination, 266, **279**
" Vacuum " method of heating, 138
Vagina, 78
Vaginal douche, 210
Vagotonus, 375
Vagus nerve, **307,** 308, 312
Valve, aortic, 59
mitral, 57
pulmonary, 60
tricuspid, **57,** 60
Valves of veins, 61
Varicocele, 238, 239
Varicose ulcer, 238
veins, 238
Vas deferens, 78
Vein, hepatic, 63
portal, 63
pulmonary, 61
Veins, 58
diseases of, 238
iliac, 59
valves of, 61
Vena cava, inferior, 59, 62
superior, 59
Venereal disease, 267
Venous blood, 61
hæmorrhage, 107
Ventilation, 136
natural, 136
" Ventral," 302
Ventricle, fourth, 287, **303**
Ventricles of brain, 295
of heart, 56
Veranda, for open-air treatment 180
Verbigeration, 528
Vermiform appendix, 53, **74**
Vermifuges, 281
Vermis (brain), 303
Veronal, mental disorder due to 476
Vertebra, atlas, 43
axis, 43
Vertebræ, 42
cervical, 42
lumbar, **42,** 43
thoracic, **42,** 51
Vertebral artery, 295
column, 42
Vertebrata, 287
Vertebrate, primitive, 288
Vesicles, cerebral, 288
Vestibular nerve, 320
reaction, 321
Vicious circle, mental deficiency 564
Villi, 72
Violence, 23, **446**
dangerous, 450
dealing with, 449
overcrowding, 448
preventive measures, 447
slight attacks, 449

Violence, surroundings, 448
Vision, binocular, 317
Visitors, treatment of, 10
Visual hallucinations, 443
  images, 352
  purple, 318
Visuo-sensory area, 317
Vitamins, 152
Vitreous humour, 315
Volition, disorders of, 413
Voluntary *v.* automatic movements, 326
  ganglia, 286
  muscles, 35
Vomit, blood in, 183
  " coffee-grounds," **183,** 251
  fæcal, 183
  foreign bodies in, 183
Vomiting, 227, 251
  observation of, 182
Vorticella, 283
Vowel sounds, 321

Walks, country, 502
Wandering cells, 284
Ward, care of the, 158
  cleaning a, 158
Washing, 145
  patients, 174
Wassermann reaction, 532
Waste and repair, 135
Wasting in respiratory disease, 245
Water, 69, 151, 152
  bed, 173
  supply, 145
Water-borne organisms, 264
" Water on the brain," 530
Waterproof sheets, 173
Wax, paraffin, 118
Weak-mindedness, 423
Weapon, control of, 452
Webbed fingers, **525,** 535
Weight of body, 134
" Well-set-up man," 393
Wet pack, 212
Wetting of bed, 422
What is the mind ? 331
Wheezing, 185
White blood corpuscles, **54,** 63
  matter, brain, **293,** 301
Wild boy of Aveyron, 533, 574
Will, 345
Willis, circle of, 275
" Wind," 255
Witchcraft, belief in, 410
Womb, 50, **78**
Wonder, emotion of, 342
Wood-chopping, 585
Wool: clothing, 147
" Word-blindness," 528
" Word-deafness," 528
" Word of honour," 502
Work, 516
Working hours, 585
Workshops, 581
" Workshy," 545
Wounds, contused, 111
  emergency treatment of, 111
  incised, 111
  lacerated, 111
  punctured, 111
Write, learning to, 578
Writing, area for, 297
  left-hand, 529
  mirror, 529
" Wrist-drop," 394
Wrist reflex, 387

Yawning, 185
Yeasts, 263
Yellow spot, 306
Yew, 124

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